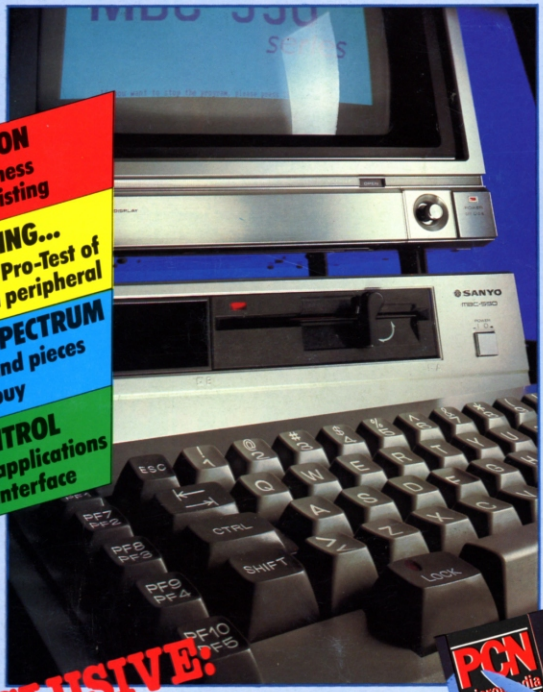
PERSONAL weekly COMPUTER NEWS

50p February 25, 1984 No 50 BRITAIN'S BIGGEST WEEKLY



ORIC ACTION
Maze madness in our free listing

64 SPEAKING...
...in an exclusive Pro-Test of a plug-in speech peripheral

SPECTRUM'S SPECTRUM
The best bits and pieces you can buy

BBC IN CONTROL
Switch on to new applications with the DCP interface

EXCLUSIVE:
Close-up of Sanyo's cut-price MSDOS system

OUT NOW!
Pull-out guide to printer

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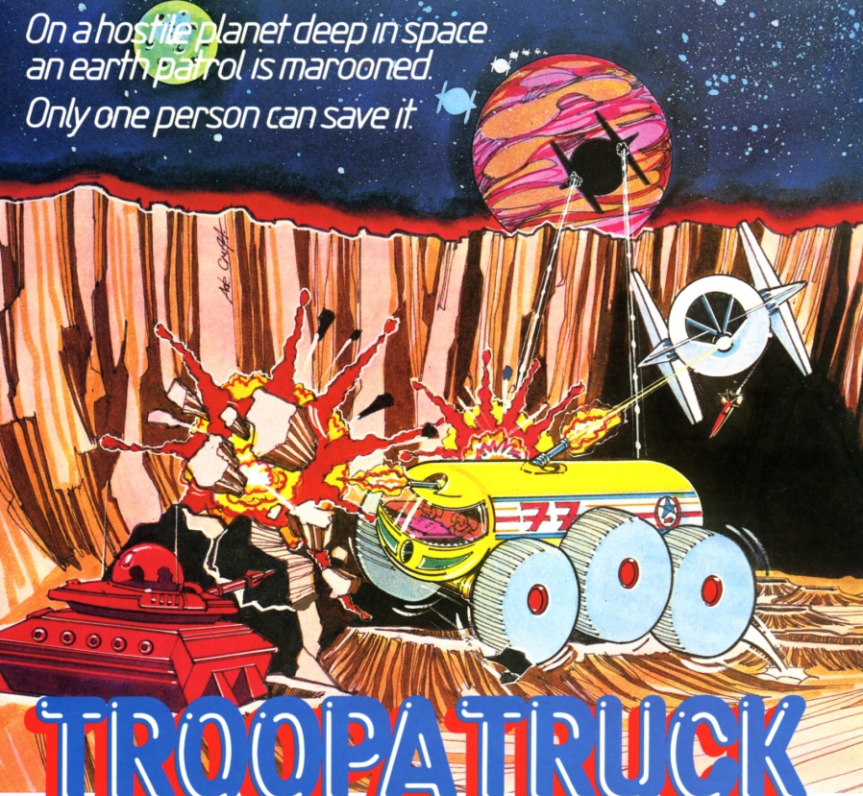
your chance to win one of five Epsons



TROOPA TRUCK

The galaxy's most lovable battle wagon.

Narzon Heatseekers from the back. LasaSlamma Tanks in front. HeliChargas from above.

A friendly mission to Zon has become a desperate fight for survival.

Now, as Troopa Truck trundles and leaps across Zon's surface, only one person in the galaxy can save it.

You.

The ticket to Zon is £5.99 (RRP inc. VAT), and the journey starts at Boots, WH Smith, Rumbelows, or any intergalactic computer games shop.

Your Commodore 64 will love it to bits.

RABBIT SOFTWARE LTD

Brilliant on Spectrum, VIC-20 & CBM-64.

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PCN

February 25, 1984 No 50

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Pull out and keep

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PCN begins a three-part series on printers, building into a complete guide to choosing, buying, using and maintaining these useful, often invaluable, peripherals.

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We're giving away five of these superb dot-matrix printers in our latest competition in conjunction with Micropaedia. The RX80 is a versatile machine capable of fast draft quality print, or high quality output in a variety of styles including italics and emphasised modes. It also offers dot-addressable graphics. Don't miss your chance to win one.

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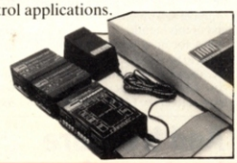

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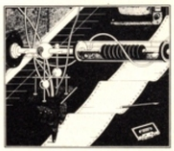

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Tiptoe through the minefield in this explosive program for you to key in.

QL queue stretches . . .

By Geof Wheelwright

You could be waiting up to four months for delivery of a Sinclair QL micro.

Sinclair Research has sent out letters to everyone who has so far ordered the machines — and for orders that were placed on the day of the machine's launch they promise that 'we expect to be able to deliver your QL not later than the end of May.'

A Sinclair spokesman said last week that the delivery dates in the letters are 'worst case' dates and that actual deliveries may be made some time earlier. He added that the company still plans to start shipping QLs to customers by the end of this month.

But for most people the wait is going to be at least 28 days and in all likelihood about three times longer. During that period they will have neither the £400 cost of the QL nor the QL itself to play with. Sinclair said although it is cashing all the cheques it receives for the QLs, those cheques are going straight into a trust account which Sinclair cannot touch until it delivers machines to the people who ordered them.

The demand for the QL has been phenomenal from the day we launched it. We expect to be able to deliver your QL not later than the end of May. We realise that the time between now and then will be frustrating, but we are confident that your QL will be worth waiting for and, of course, we will do everything possible to beat our target date for sending it.

Yours sincerely

Nigel Searle

Nigel Searle
Managing Director

Now the bad news — Sinclair's letter to customers.

The Sinclair spokesman said he doesn't yet know what will be done with the interest generated by the money sitting in the trust account, and added he hasn't yet considered offering either free user group memberships or other consolations to people facing long delays. However, a little mathematics shows that money paid before delivery could generate a large amount of interest.

Sinclair has said that orders are currently running at about 500 per day — so that in the first 30 days, the company would have received about 15,000 orders for an average of about £400 each (the figure will be higher for people who have ordered the optional QL user group (QLUB) membership). This amounts to about £6 million in orders received so far (give or take £1 million) — generating between £70,000 and £100,000 if left in a trust account for two months at between 7 and 10 per cent interest.

The final interest figure could be lower than £70,000 depending on how many people ordered their QLs by credit card — credit card orders cannot be processed until the product is being despatched. And Sinclair is encouraging people to place their orders by credit card so that they don't tie up their money while waiting for the QL to be delivered.

'We don't want to mislead people in any way,' said the spokesman.

And treasure hunt reaches fever pitch

By Ian Scales

The launch of the Sinclair QL has sparked off a treasure hunt atmosphere rarely seen since the Gold Rush days of the old West. Sinclair computer releases, or rather the expectations they generate, seem to have reached new heights — here's the state of play.

When it was considered that Sinclair had produced three micros in rapid succession — the ZX80, ZX81 and ZX Spectrum in successive years — it seemed that the longer the gap between the Spectrum and its successor, the more earth shattering the product was likely to be. A whole industry, spawned by the Spectrum and gaining nourishment by providing software, add-ons, publications, and sundry other services, was poised ready.

At present, the QL is still being churned off the assembly lines — deliveries may (just may) be starting as you read this. But already hardly a day goes by without more symptoms of QL fever appearing.

The first stunning announcement was from an outfit calling itself the Independent QL Users' Group — completely independent of QLs presumbably. One imagines a group of hardened hackers meeting in a draughty hall comparing Sinclair order-form confirmation slips.

Then came the fully-blown half-baked publication called QL User. The only people who have actually used the thing so far are a handful of software developers, Sinclair staff and a few journalists — and then for a limited season only. QL User has to limit itself at this stage to an overview of the machine.

Joe the Lion (member of the Pase group of companies) is happy to announce the first of a range of programs for . . . guess what? The Spectrum Emulator will be available on microdrive so you can load a Spectrum machine code program into the QL and run it as on a Spectrum. Joe the Lion has yet to write the thing and requires programmers 'urgently'.

Then there's the fascinating upsurge of myth and rumour. Several companies are supposed to be working on monitors especially for the QL. Another hot tip (to be taken with a pinch of salt), concerns Sinclair's buying up some 7,000 3in Winchester disk drives which it plans to knock out to the users at £200 a shot once it has the interfacing worked out. This one seems unlikely — when asked the Winchester drive question at the QL release Sir Clive maintained that his company could see no cost advantage for the user.

Desk-top duo

The UK's two biggest names in computing have got together to re-arrange desk-top micro-processing.

ICL is expected to launch a system known as One-per-Desk later this year. Built around the Sinclair QL technology it will also include telecommunications facilities, bringing the prospect of very cheap networking combined with powerful local processing to business users.

With a QL or its elements on board the One-per-Desk could offer local main memory of up 640K, with microdrives giving an extra 100K each. QDOS combined with the 68008 processor holds out the promise of fast multiple tasking. The bottom line, price, could be exceptionally low for a networked terminal, since the QL itself costs £399.

Implicit in the device's name is the suggestion that ICL intends it to take on many of the day-to-day office jobs that are more commonly done manually — diary notes, memos, call logging *etc* — besides local computing, word processing, and the possibility of using the resources of a network. ICL's connection with the Canadian telecomms specialist Mitel will take care of one aspect of the network and its experience with networked products from micros to mainframes will handle another.

ICL intends all its products to have networking capability in future — its established DRS range of 8-bit work stations is intended to be compatible with IBM and ICL mainframes. This range in fact makes up 30 per cent of the company's entire sales.

The development also goes hand in hand with Sinclair's plans for the future. 'Utilisation of our technology into that kind of field supports our general move into more professional-type markets,' said a spokesman.

IBM into takeaway business

STOP PRESS

It's official — IBM is to launch a transportable micro which will go on sale in the US from March 1 at a price of $2,795.

It is thought the machine will weigh in at 25lbs and will run virtually all the programs that run on the PC.

At the same time IBM also announced a 'cluster control program' that will allow up to 64 PCs to be linked together in a network at a cost of around $500 per connection.

It is too soon to say when these products will be available in the UK or how much they will cost. When they do arrive they will find an anxious queue of buyers. 'A portable IBM will sell like hot cakes,' said one major IBM dealer.

Hardest hit by the IBM announcement will be Compaq and Bytec Corporation which make IBM comaptible portables. IBM had been expected to announce a portable PC some time this year but its decision to release it so soon was probably motivated by the success of the plug compatible manufacturers and the less than enthusiatic reception that greeted the PC Jnr.

Industry analysts now expect the next product release from IBM to be a lap-held portable.

More details about the new IBM PC and the networking system will appear in next week's issue.

Rent-a-program

Buying software on cassette could soon be a thing of the past if two developments just announced take off.

Prism Microproducts has released details of its pilot scheme to distribute software to shops over the telephone. The shop would then sell it on to micro users in the form of re-programmable cartridges. When you get fed up with a game the idea is that you can go back to the shop and reload the cartridge with a new game.

Meanwhile British Telecom's Cable Interactive Services subsidiary has signed a deal with Rediffusion to run a 'software by cable' scheme. For £9.95 a month a subscriber will get a 48K Spectrum, special modem and a choice of free games and educational software.

Prism first announced its intention to launch its re-programmable cartridge service in July last year (Issue 19). The company had secured the UK rights to a system developed by Romox, a US company.

The shop uses a special terminal to download the software from a central computer. The terminal is then used to program a blank cartridge which contains an EPROM. The user can either keep the game on the cartridge or, if he wants a new one, take it back to the shop which erases the EPROM and loads a new game.

Initially, cartridges will be available for the Commodore 64, Vic 20, Atari 600/800/VCS and TI-99/4A. Plans are also in hand to add the Sinclair Spectrum. Blank cartridges will cost between £10 and £16 each and the program between £5 and £10.

The trial scheme will be held in London and the South East and will involve major high street retailers. Initially around 40 shops will be involved.

The CIS service will initially be available through a limited number of Rediffusion's 50 local relay systems and will use two pairs of redundant wires in the cable (they were used for radio broadcasts) to transmit the software.

The modem will be a 'black box' using a unique protocol and transmission speed of 4.8K bits per second. As a result neither Prestel nor 300 baud modems can be used.

Programs downloaded on this system cannot be saved on tape or microdrive but the user can download the same program as many times as he likes for no extra charge above the £5.95 monthly subscription.

Trevor Havelock of CIS says that a lower rate for subscribers who already have a Spectrum is under consideration.

Jupiter Ace jumble sale

The Jupiter Ace looks set for one final fling before being pronounced officially dead. A Cambridge company has bought up the remaining stock of Aces but it has no intention of manufacturing the machine.

This could well be the final chapter in the Jupiter story. It is now three months since Jupiter Cantab crashed and the liquidator has been unable to find a buyer for the manufacturing rights.

The remaining stock of around 2,000 machines has been bought by Oldfield Ltd Computing (0487 840740) which intends to sell them on mail order at a price of £29.90.

Paul Downham, Oldfield's director, says that the micros will first be made available through computer clubs before it considers advertising more widely.

It is also offering a package deal of Ace plus RAM pack for £50.60 and reduced prices on Jupiter software.

Egg on faces as Elan turns into Flan

By Ralph Bancroft

Some people in the microcomputer business have thick skins. Either that or they have an enormous sense of humour.

Take Elan Computers, the company that promised (Issue 29) to produce by April a machine called the Enterprise that would have 256 colours, 64K RAM expandable to 3.9 Mb, 672 by 512 graphics resolution, four-voice stereo sound, built-in joystick and a lot, lot more for an all-in price of £200.

More than a few people refused to believe that the company could make the machine and/or deliver it on time. Elan Computers was adamant that it could. But this pales into insignificance compared to the latest credibility crisis to hit the all-new micro maker. It is having troubles with the Elan name.

PCN asked marketing director Michael Shirley whether it was true that the company was changing its name. 'Yes. We have signed exclusive distributor deals in 20 countries now and found out that we could not use the Elan name in some of them. We therefore decided to change the name so that the machine would have the same name throughout the world.'

So what is the new name then? 'I can tell you that from now on the company will be known as Flan Computers.' Would you care to spell that? 'F-L-A-N' But why? 'Well, some magazines have already started to refer to the micro as the Flan Enterprise.' (This is thought to be a reference to a typographical error on the contents page of a monthly magazine. The then editor is now Elan's software manager.)

'Also, the company already has an established corporate identity and the changes required because of the new name are minimal.'

Enterprise 64 — Flan or flim-flam?

Spectravideo cuts prices

Amid cries of 'Oh, yes it is, oh no it isn't', Spectravideo has cut the price of its MSX-like 318 and 328 machines. The rubber-keyboard 318 is down to £186 from £230, while the 328 is down from £302 to £262.

This represents something of a spectacular sea change for the machines, as just a few months ago UK distributor CK Supplies was mooting a price increase of 3-6 per cent. This, of course, was before it was generally known that the machines weren't fully MSX-compatible, and that you'd need a £30 adaptor to let you run MSX cartridges.

On top of this, there seem to be some differences between SV Basic and MSX Basic. MSX Basic allows you to set baud rate, key click and sprite size, while SV Basic only accommodates sprite size. There's also the small detail that MSX machines have a uniform prompt screen on power up, while the Spectravideos' screens say 'SV extended Basic'. A cartridge adaptor for £30 seems plausible, but a ROM rewrite at the same time and for the same price sounds like quite a breakthrough.

Self-made micro for self-made businessmen

By Wendie Pearson

Businessmen with a weakness for solder are being courted by Microcomputer Concepts. The company has produced a kit-form business micro, Microbox 2, but it will also supply an assembled version for the faint-hearted.

The minimum kit costs £109; an assembled machine with all the extras could cost £1,500, but on paper it will have many of the features of much more expensive systems.

These include the 68B09E processor, the 'E' version of the Motorola 6809 chip (the 'B' meaning it's the high speed version), and an 8K ROM that configures it for the Flex operating system.

Using the NEC 7220 graphics controller chip, high resolution graphics are 768 × 576 and its display is 108 characters × 24 lines or 128 characters × 72 lines.

Built into the machine is 64K of RAM plus a further 128K for the graphics system. This part of the RAM can also be used as a RAM disk storage system. It also has an EPROM disk. If however you prefer to be conventional, the system also takes two 350K external disk drives.

Microbox 2 comes with two RS232 interfaces, Centronics printer output, parallel keyboard input, battery driven real-time clock and calendar on board, and built-in software.

'Basically it's a bare board for people to build up themselves,' said director Jim Rew.

Microcomputer Concepts is in Cheltenham on 0242 510525.

Protek fills in

Protek has produced a cassette interface for Commodore micros that allows you to plug in virtually any cassette recorder.

Until now Commodore owners wanting to use cassette (and most software is still cassette based) have had to use Commodore's own cassette unit which was in short supply before Christmas.

The interface costs £9.95.

VIEW FROM JAPAN

MSX units stand out in the crowd

By Serge Powell

Somewhere in the back of my mind I recall the science-fiction classic *The Day of the Triffids*, with scenes of madmen running amok in the streets screaming: 'They're everywhere, they're everywhere.' Accordingly, I'm writing this on that Japanese phenomenon, the MSX machine.

At least 11 manufacturers have taken the plunge, with some 17 models making the home micro scene as crowded as the Tokyo area beach on an August weekend. The major producer is Fujitsu, which claims the number three spot in Japan's PC market behind the leader NEC and second-placed Sharp; these two opted out of the MSX plan fairly early on, but a gaggle of others are following it through.

The cheapest current offering, from Fujitsu, is a unit called the FM-X which attaches to an FM-7 ROM adaptor. Another unit comes from Sanyo — the Wavy 10 — featuring 32K of RAM and a facility to draw freehand on to the screen via a lightpen, as well as some music programming.

Canon, a company better known for cameras and photocopiers, was one of the last into the micro field and it has chosen price and performance to make its offering stand out, aiming to lay out more for less. It costs £165, which puts it at the lower end of the MSX range (roughly £150 to £225) and it features an electronic typewriter-like keyboard, two slots besides the cartridge maw and a printer interface.

On the other hand Hitachi, already established as a computer maker, went straight for its target — schoolchildren — and included in its MB-H1 such features as a speed controller to let you slow down games or educational programs until you have the basic skills.

From the maker of musical instruments Yamaha come three units designed to function as the central processor of a synthesiser. With three models available, Yamaha is obviously intent on presenting itself as the supplier of the open option.

JVC has also opted to take advantage of its particular technical strengths with production of micros that interface especially well with video disk and cassette players.

Traditional innovator Sony, with its HB-55, has packed its unit with some original software that works as a single database for scheduling, addresses, messages *etc.* This system is billed as a computer secretary and I'm sure no home is complete without one.

Sony's equally traditional rival Matsushita might not agree, but its 16K RAM CF-2000 doesn't look like too much of a threat except for what must be a highly unusual keyboard — 'joystick-like cursor keys' is Matsushita's description.

Mitsubishi, the electronics giant that we all tend to overlook, has come in with a full array of peripheral devices including a RAM expansion board, a Kanji ROM, a small robot and other items. The CPU itself has 32K RAM which seems mundane by comparison.

Toshiba decided to come in big or not at all with its Pasopia range, and last but not least is General, which offers the PXR — a CPU built into the monitor/receiver TV that uses on-board electronics for game-playing but which requires you to buy a keyboard as an extra.

The point, you will have noticed by now, is that although at face value MSX sounds like a recipe for innumerable micro makers to churn out innumerable identical micros, what is actually happening is that they are all paying to their strengths. The result so far is a variety of functionally compatible micros with different specialities.

It could be that somebody will scoop the pot by combining these specialities under one label. To do so would bump up the price for sure, but it would spare you the trouble of buying a new micro every time you want to do something significantly different. The purpose of MSX, after all, was supposed to be to encourage standardisation so that software driven functions would be interchangeable between machines.

Stay tuned for the continuing MSX story. Who knows where it will lead next? If it turns out to lead in any volume to the US, it could be *The War of the Worlds* instead of *The Day of the Triffids*.

Memotech rolls out its disks

Memotech has formally launched its disk system for the MTX 500 series together with a networking system and a printer. It also announced plans to sell the machine in the US.

The FDX disk system offers twin 500K floppies, 80 column card and CP/M for a price of £870. An FDX system with 256K silicon disk and single floppy costs £995. The silicon disk is a RAM board that considerable speeds up disk access times. Both systems require the MTX 500 to be fitted with the £60 communications board.

The printer, which costs £295, is essentially an Epson in a new box to match the colour scheme of the rest of the Memotech products.

In addition to the floppy system Memotech also has available a hard disk system using 10, 20 or 32Mb Winchester drives. Prices have yet to be announced.

Memotech, is on 0993-2977.

Memotech — on the road with disk systems.

A word to the wise in many languages

It may not be too long before you can have your business letters translated into French or German by your micro.

Two events last week marked significant inroads into the area of machine translation.

The major one was the three-day conference organised by the Natural Languages Translation Specialist Group of the British Computer Society. Delegates from around the world spoke on recent developments in theory and approach and demonstrations of some systems were given.

On a simpler but more practical note Longmans, the publishing house, launched Tick-Tack. This program allows you to select phrases from a set supplied on disk, enabling the user effectively to translate a business letter into a variety of languages.

While this is not a true translation program, it does show that interest in the area is high and that such programs are seen as commercially viable products with a ready market.

Tick-Tack costs £150 and runs on Apple, Sirius and IBM micros. Versions for French, German and Spanish are available, and for the export market Longmans has thoughtfully produced an English package as well.

Oric launches Berlitz rival

Tansoft has become the first software publisher to translate Dr Mike Gruneberg's innovative language classes on to micro tapes.

Dr Gruneburg's psychological approach to foreign language tuition has been taken up by software specialists for various machines, but Oric users are going to have the first look at it. Called Masterclass, it is available from Tansoft in French, German, Spanish and Italian at £12.95 each.

The Gruneberg approach, claimed to bring you to a basic level of competence within 10 to 12 hours, relies on mnemonics that relate the sound of a foreign word to an image provided in English.

Gruneberg's technique has the endorsement of such a seasoned traveller as the Thomson Holiday organisation but he, more modestly, calls himself a psychologist rather than a linguist and claims to have no more than a smattering of a couple of foreign languages.

Chip shortage looms

By David Guest

Several UK micro makers stand to have their growth stunted this year by a chip shortage that they can do very little about.

If you want to buy their goods you may find that you'll have to wait; if you already have a system it could be that they won't be coming up with add-ons or upgrades as quickly as they might. This is the price of dependence on US and Japanese suppliers. It is a form of colonialism, and far from doing anything about it the Government is looking at the possibility of selling the UK's only bulk producer of standard chips — to a US corporation.

Inmos, set up by the Government in 1978, has so far cost British taxpayers more than £100 million. It has reached the stage where it could become not only an important supplier of various types of semiconductors but also the source of a new style of computer. But it is still short of money and this has been enough to attract the interest of AT&T, the US telecommunications giant.

Inmos already supplies British micro makers, with Oric being a notable example. But in the short term it can't compensate for what has become a worldwide shortage of semiconductors.

Ultimately, this could threaten the very existence of some UK micro makers — it has already cost them sales, particularly in the weeks before Christmas, and it eats into their profitability by playing havoc with prices.

Sinclair suffered visibly before Christmas — demand for the Spectrum surged, with Acorn unable to produce many Electrons, but having placed its component orders on the strength of estimates made during the summer Sinclair couldn't find any ad hoc supplies to push up its production further. Dragon was in a similar position.

For the business micro makers the problem is less seasonal but more specific. The popularity of certain types of chip puts great pressure on the semiconductor producers, most of whom have been going through relatively hard times in the last two years — National Semiconductor, for example, recorded a loss for the first time in its history in 1982.

Intel, supplier of the chip that drives the IBM PC and so many clones, illustrates the problems that could lie ahead for UK customers. It is 12 per cent owned by IBM: US analysts say that it is as even-handed as it can be in its allocation of chips, but the company itself admits that when lean times hit the industry it is the bigger companies which are best placed to weather them. It seems unlikely that IBM will ever be seriously short of 8088s.

The 80186 looks set to follow the 8088 in popularity and it may cause Intel to eat further into the millions available to it through IBM's taking a stake, to develop the facilities to produce the chip in sufficient quantities.

It is against this background that AT&T has made its move on Inmos. It is understood to have offered £45 million for the 75 per cent of the company that it currently held by the British Technology Group (BTG). In this case the BTG is a kind of trustee for the British public; taking its role seriously it has commissioned US consultants to advise it on the value of the company, and the advice is that the BTG shouldn't sell for less than £200 million. Britain's own GEC, opportunist and cash rich, values Inmos at rather less than £45 million.

But the Government's apparent inclination to sell Inmos for very much less than its worth is beside the point. In the interests of the UK micro industry, and hence of UK micro users, it should ensure that Inmos remains in UK hands.

It should also tidy up a number of anomalies, particularly the present distribution of Inmos' manufacturing activities, which causes the company to be a bigger employer in the US (at its Colorado Springs plant) than it is in the UK.

To further help the UK manufacturers it should exert some pressure on the EEC to see that the current tariff structure, which penalises firms that import components as opposed to finished foreign-built micros, is altered in the local manufacturers' favour.

Finally, it could see to it that overseas computer suppliers aren't given the kudos of a Royal Warrant where a UK candidate might be found.

This may sound like asking a lot of an apparently inert Government. So it is, but it should be tackled. Nor is it a drift towards little Englander isolation — it's simply looking after number one, which the US and Japan have virtually adopted as a motto.

SOFTWARE

The new releases

Games

Commodore: No slur is intended on the famous engineer in Alligata's (0742 755005) latest offering Killer Watt. The point is to find a dozen light bulbs in a dark cavern. Alligata promises 'imaginative sound effects'. Starcade (051-487 0808) has adapted Savage Pond for the Commodore 64; a BBC version is due in March. These and the existing Atari version will sell for £8.95.

Spectrum: For the 48K, Melbourne House (01-9406064) has released Classic Adventure, which dates from the 1970s when its Fortran code needed 200K. Its space demands are more modest now, as is its price — £6.95. Cases Computer Simulations (01-858 0763) has added two war games to its range — War 70 goes back to Napoleonic days, and Pacific War is set around Guadalcanal. Both of them cost £6.

Dragon: From Dragon Dungeon (Ashbourne 42529) comes Klartz and the Dark Forces for the Dragon 32. It is described as a multi-adventure, *ie* a collection of interlocking parts you can enter or exit at will. It costs £9.95.

Atari VCS: Activision's (0628 72448) latest offerings, each costing £29.95, are Frostbite for the igloo-building enthusiast and Space Shuttle for interstellar overdrivers.

Education

Spectrum: With doggedly cheerful titles like French is Fun and German is Fun can CDS Micro Systems (0302 744129) possibly fail? Find out for yourself for £5.95 each, if what you need is something to brush up with or to give you a start with the language before you go on holiday. Camel Micros (03057 70092) has launched 3-D Spell, which also has a foreign element in that you can set up lists of foreign words using its perspective graphics and machine code routines. Tom Shipman (Supplies) has got the message about its crass packaging (Quit, Issue 48) — its Map Reading program is much more restrained. The price is £7.95.

Business

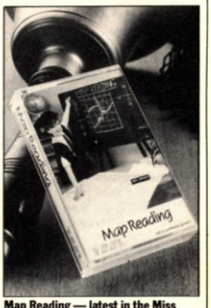
Apricot: Peachtree's Pascal Accounting System (PPAS) is now available to users of ACT's favourite micro. PPAS has five modules — sales, purchase and general ledgers plus stock recording and sales invoicing — which cost £190 each. The software already runs on the Sirius, DEC Rainbow 100, and IBM PC. Peachtree is on 0628 32711.

Apple: The Practicalc II spreadsheet will run on the Apple II+ and Apple IIe if you buy the software from Micro Marketing Software (0473 462721). Besides being adapted for the Apple systems the new version has 15 additional features. It costs £69.95.

Unix: Logical Step's (0789 842082) CFACC integrated accounts program, which previously ran under CP/M, MSDOS and their derivatives now fits into a Unix environment as well.

IBM PC: The Sales Edge is a US package designed, as its name suggests, to give you and your functionaries a better chance in business than your competition — unless your competition also possesses the Sales Edge. Allegedly produced after ten years of research its basic aim is to turn to advantage your good points and to paper over the rest, turning you into an irresistible salesperson or executive. Priced at £249, it is now available in the UK from Marketing Software on 01-731 3083.

Epson: For the HX-20 in the hands of an engineer Kuma has released the 17th element in its Deskmaster series. The program is said to be sufficiently powerful to be used in serious project analysis work, involving the use of Pert (Program Evaluation and Review Technique) and CPM (Critical Path Method). Deskmaster 17 costs £57. Kuma is on 07357 4335.



Map Reading — latest in the Miss Shipman series from Tom Shipman (Supplies).

Musical micros in key

By Tony Sacks

Music and micros are merging fast and it shouldn't be long before you'll all be able to join in.

The device that is making the difference is called the Musical Instrument Digital Interface (MIDI), and at the music industry's annual trade show held recently in Frankfurt you could hardly move for it.

MIDI is a 31.25K baud serial connection that carries digitally encoded information to tell instruments which notes to play, how loud they should be, when to sound the notes and for how long, and which 'voice' to use. It can control 16 electronic musical instruments at once.

It is rapidly being adopted as a standard by the makers of electronic instruments. At Frankfurt, almost every synthesizer manufacturer was showing instruments with the MIDI DIN sockets, and on some stands computers outnumbered instruments.

The most powerful demonstration of what MIDI can achieve was on the Yamaha stand where the company's CX5 computer was controlling a group of eight different synthesizers, each playing a separate part.

The CX5 is an MSX computer with a difference. A slot in its base can hold a module containing the electronic voicing circuits of Yamaha's £900 DX9 synthesizer, introduced last year to a rapturous welcome from musicians.

The CX5 module, in addition to housing the DX9 circuits, acts as a MIDI interface for controlling other synthesizers. A plug-in piano-type keyboard controls either the built-in synthesizer or other instruments connected to the module via the MIDI link.

One item of CX5 software demonstrated at Frankfurt allows a musician to use conventional musical notation to compose an eight-part melody lasting around eight minutes. This tune can then be played back through instruments using the MIDI link and can be printed as a conventional musical score.

When it arrives towards the end of the year the CX5 is expected to cost around £550 for the computer, synthesizer module and extension keyboard.

But you won't have to wait that long to control a synthesizer with your micro. Several companies are developing MIDI interfaces and the software which will allow popular micros to conduct a group of electronic instruments.

For example, MIDI interfaces for the Spectrum, Commodore 64 and Apple II computers, with German prices around £85, were demonstrated at Frankfurt by Jellinghaus Music Systems of Dortmund. Software for the Spectrum includes a £20 sequencer which will store a string of 9,000 notes, and a £50 composer program which will control eight different instruments simultaneously.

At least two British companies are also developing MIDI hardware and software. Electronic Research hopes to produce a hardware module suitable for most popular micros by the summer. The projected price is around £150; software packages will cost around £25.

And a group of members of the high-IQ club, Mensa, has developed an interface and software for the 48K Spectrum which it is selling as a £179 package.

MIDI software on show at Frankfurt included several 'multitrack digital recorders' which allow a musician to store a tune in a computer's memory directly from the synthesizer keyboard. Harmonising sections can be added later on other digital 'tracks'.

An Apple IIe takes over the keyboard of a Seiko syntheiszer through MIDI software . . .

. . . and a not so humble Spectrum tinkles the ivories via MIDI technology.

PERIPHERALS

The new releases

Printers: NEC, best known for its letter quality Spinwriter, is branching out into the world of dot matrix printers. Its P2 (80 column) and P3 (136 column) printers offer three printing modes, 180cps for data processing, 90cps for draft quality and 30cps for 'near letter quality'. Software selectable spacing (including proportional spacing) and a choice of interfaces are some of the features in the suggested selling prices of around £700 and £800. Further details from NEC on 01-3886100. Cheaper, quieter and faster than the NEC is the Siemens PT 88i ink jet printer. It gives near-letter quality at 150cps and a version configured to print all the IBM PC graphic characters is available from Riva Terminals at £595 (04862 71001).

Speech synthesis: If you tire of the dulcet tones of Kenneth Kendall you can now turn your Beeb into a sweet talking machine with

NEC, sprightly on its pins.

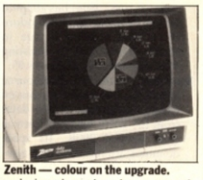
Sweet Talker from Cheetah Marketing (01-278 6954). At £24.95 it comes as a chip that plugs into the speech socket in the BBC and uses an allophone system which Cheetah claims gives you 'totally unlimited vocabulary'.

Light Pen: Datapen (0256 770488) has produced a version of its lightpen to work with the Commodore 64. Priced at £25, it comes with an introductory program that shows you how to move and place sprites, and two other programs called Colour-Draw and High-Res Draw.

Colour Monitor: You can get colour monitors for under £200 but low-cost usually means low-resolution. Now Zenith's ZVM-133 costs £395 (+ VAT), displays 80 + 25 line text screens and 640 + 480 high-res graphics, has a bandwidth of 20 MHz and uses an RGB input. Details on 0452-29451.

Cassette Recorder: Banish those loading blues with Bell & Howell's 3179CX heavy duty cassette recorder. £39.95 buys you a machine that is not only

Datapen adapted for the 64.



Zenith — colour on the upgrade.

designed to take a heavy pounding (ideal for schools, says B & H) but is also configured to work with the BBC's motor control, and the Spectrum. It's available through LVL dealers or B & H's own dealers.

Robot Arm: make your micro useful with Cyber Robotics' 310 robot arm. The only language it understands is RoboForth, an extension of Forth. But talk to it nicely and it will rotate and pick things up. Ring 0223-210675 for price and further details.

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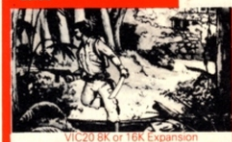

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PCN charts

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets from January 25 to February 9. The games chart is updated every other week.

Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every two weeks.

PCN Charts are compiled exclusively for us by RAM/C.

Hardware Top Ten up to £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
►1	(1)	Spectrum	£99	(SI)
►2	(2)	CBM 64	£229	(CBM)
▲3	(5)	Vic 20	£140	(CBM)
▲4	(9)	Dragon 32	£175	(DD)
▼5	(3)	ZX81	£40	(SI)
▼6	(4)	BBC B	£399	(AC)
►7	(7)	Oric 1	£99	(OR)
▼8	(6)	Atari 600XL	£150	(AT)
▲9	(18)	Electron	£199	(AC)
▲10	(13)	Apple IIe	£750	(AP)

Top Ten over £1,000

TW	LW	MANUFACTURER	PRICE	DISTRIBUTOR
► 1	(1)	IBM PC	£2,390	(IBM)
► 2	(2)	ACT Sirius	£2,525	(ACT)
▲ 3	(9)	DEC Rainbow	£2,359	(DEC)
▲ 4	(5)	Apple III	£2,780	(AP)
▼ 5	(3)	ACT Apricot	£1,760	(ACT)
▲ 6	(—)	ICL PC	£2,065	(ICL)
▲ 7	(—)	Kaypro 10	£2,595	(CKC)
▲ 8	(—)	Wang Professional	£3,076	(WANG)
▲ 9	(—)	NCR Decision Mate	£1,984	(NCR)
▲ 10	(10)	Epson QX10	£1,995	(EP)

Distributors: AC Acorn **ACT** ACT/Sirius **AP** Apple **AT** Atari **BW** Brainwave **CKC** CKC Computers **CO** Commodore **Dragon Data DEC** Digital Equipment **EP** Epson **ICL** ICL **IBM** IBM **NCR** NCR **MD** Midlectron **OR** Oric **SI** Sinclair **Wang** Wang.
Machines: SP Sinclair Spectrum **AC** Acorn BBC **64** Commodore 64 **V20** Commodore Vic 20**81** Sinclair ZX81 **DR Dragon OR** Oric **AT** Atari

Games Top Thirty

	GAME TITLE	PUBLISHER	MACHINE COMPATIBLE								PRICE
			SP	AC	64	V20	81	DR	OR	AT	OTHERS	
▲ 1 (7)	Hunchback	Ocean	★		★				★			£6.90
▼ 2 (1)	Manic Miner	S/W Projects Bugbyte	★		★							£7.95
▼ 3 (2)	Atic Attic	Ultimate	★									£5.50
▲ 4 (8)	Stonkers	Imagine	★									£5.50
▲ 5 (—)	Space Shuttle	Microdeal	★	★	★			★	★			£8.00
► 6 (6)	Death Chase	Micromega	★									£6.95
▼ 7 (4)	Chequered Flag	Psion	★									£6.95
▲ 8 (9)	Flight	Psion	★									£7.95
▼ 9 (5)	3D Ant Attack	Quicksilva	★									£6.95
▲ 10 (13)	Mr Wimpey	Ocean	★									£5.90
▼ 11 (3)	Alchemist	Imagine	★									£5.50
▲ 12 (23)	Fighter Pilot	Digital	★									£7.95
▼ 13 (12)	Lunar Jetman	Ultimate	★									£5.50
▲ 14 (15)	Horace Goes Skiing	Psion/Melbourne	★		★							£6.95
▼ 15 (11)	Arcadia	Imagaine	★		★	★						£5.50
▲ 16 (25)	Rev Of Mutant Camels	Llamasoft			★							£5.95
▲ 17 (30)	Dragrunner	Cablesoft						★				£6.00
▼ 18 (10)	Jet Pac	Ultimate	★			★						£5.50
▲ 19 (28)	Birds & The Bees	Bugbyte	★									£5.95
▲ 20 (—)	Wizard & Princess	Melbourne	★									£6.95
▲ 21 (27)	Pyramid	Fantasy	★									£5.50
▲ 22 (—)	Pool	CDS	★									£5.95
▲ 23 (26)	Kick Off!	Bubblebus	★		★							£6.99
▼ 24 (18)	Kong	Ocean	★									£5.90
▼ 25 (16)	Valhalla	Legend										£14.95
▼ 26 (14)	Harrier Attack	Martech/Durell	★						★			£5.95
▼ 27 (21)	Hungry Horace	Poison/Melbourne	★		★			★				£5.95
▲ 28 (—)	Twin Kingdom Valley	Bug-Byte		★	★							£5.95
▲ 29 (—)	Snooker	Visions	★	★	★	★						£8.95
▼ 30 (17)	Hovver Bover	LLamasoft			★							£7.50

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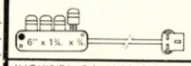

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A saucerful secrets and how to keep them

It is not possible to protect any program against a determined interloper with a good knowledge of maths, electronics, and a lab full of equipment.

Matthew Platts (Routine Inquiries Issue 47) will have to content himself with making it difficult enough for it to be worth no-one's time and effort to do so, and even then there will be 'freaks' who enjoy the intellectual challenge of finding ways around his security measures.

However, in *The Oric Handbook* Bob Maunder gives a couple of calls which disable and re-enable the keyboard (E6CA and E804). By using these, and POKEing 0063 (hex) so that the program is always loaded and saved in the AUTO mode, Mr Platts will make the freaks work very hard.

Mr Platts should be aware, that the sale of a secured program which has a bug in it may make him liable to refund the full purchase price, plus the costs incurred, by anyone who cannot get the program to run. He would be well advised to consult a good lawyer about the implications of the Sale of Goods Act and the Trades Descriptions Act.

John Peppworth
Wembley, London

Sinclair QL's after sales service

The much publicised Sinclair QL has arrived and as usual offers a price/performance ratio unmatched by its competitors. As a small businessman, convinced that computers will become more and more commonplace in everyday working, I believe Sir Clive more than any other person has been responsible for bringing the computer within everyone's financial reach.

It may appear somewhat churlish, therefore, to criticise his new offering before a benchtest. The new computer includes four business software packages together with built in Microdrives for mass storage. It is fair to presume that this computer is intended for serious business use therefore. How does Sir Clive intend to sell this computer? By mail order. It just won't do. Here for Sir Clive's benefit is what businessmen want:

1 Reliability
2 Cost effectiveness
3 Local area dealership — with repair facilities and maintenance.

I'll bet it won't be long before the usual horror stories of long delivery delays are related through your pages, together with teething problems and preposterous sometime-maybe-never repair times.

Games enthusiasts may put up with these problems but I can assure you that businessmen won't. If Sir Clive is serious in his intentions to break into the business market the above points have to be remedied.

I feel sure that serious users would be prepared to pay more for the hardware if specialist dealers were given the incentive to sell his products — the price after all is more than competitive. As it is I fear that software houses will in the main just produce more sophisticated games and Sir Clive will have missed the market.

K W Halbert
Coventry

Break of service costs Atari the set

Having recently taken the plunge into the micro hobby, I find myself with a number of questions begging answers.

After a fair amount of consideration in choosing a machine, I settled on the Atari 400, which, no doubt as a result of the introduction of the new XL series, was made available at a very favourable price. I now find that it is one of the most poorly served machines in terms of available software, apart from that available from the manufacturer.

Why is it that so few independent software houses are willing to cater for the Atari machines, and when they do, what makes the programs so expensive?

As far as I can tell, Atari Basic is a pretty comprehensive dialect, and

PCN £10 Star Letter

machine code would seem to be reasonably easy to write by an experienced program author for the 6502 processor.

To my admittedly inexperienced eye, it seems as if it should be as easy, if not more so, to write for the Atari as it is for such other machines as the Spectrum, Dragon, Oric and Commodores, let alone the BBC with its complex screen display commands, so why the dearth of material?

I'm not even asking for original programs — after all, why should I miss out on the joys of the Hobbit, Manic Miner and similar? Surely if these can be translated for other machines they can be adapted for mine.

The standard answer, I suppose, is that I should write my own. Great idea, and I intend to when I am a bit more *au fait* with the machinery and the language, but in the short term, I have a family which gets fed up with me sitting playing with the computer while trying to learn. It would be better to have something other than blast-'em type games to keep them amused occasionally.

The Atari range is mostly limited to arcade style games, and at nearly £30 a time, expensive. The rest of the market is limited, and still seems to be twice the price of comparable software for other machines.

Perhaps manufacturers, authors or publishers could give me some kind of answer.

B C Heath
Old Basford, Nottingham

We sympathise with this problem, so we're going to help. In just a few weeks we'll be publishing the first of a number of articles on programming the Atari. Meanwhile, we await an answer — Ed.

Where's best for buying a micro?

Computers in this country really have taken on now, particularly the cheaper home micros. In fact there are now more computers per head in this country than Japan.

As a result of this, and of the increasing numbers of people buying computers, shops selling them are increasing at an alarming rate. This all sounds very good, but just how good are the shops themselves?

The amount of everyday high street stores stocking the basic range of home computers such as the Spectrum, Vic-20, Dragon and BBC machines, is incredible.

It is obvious that major stores want to cash in on the act, but how efficient are their sales staff? Are they specially trained in computers or not? All too often with the mass-produced computers the odd few (or more) may happen to be faulty. Now, are these high street stores staff members as able to aid users in their problems? I rather think not.

To my mind you can't beat the specialist computer shops. I myself has a Spectrum that wouldn't SAVE or LOAD. I took it to my local computer shop, where they spent half an hour checking it for me — for nothing. Therefore I knew that it was my cassette recorder at fault and not my computer. Can you imagine large high street stores spending 30 minutes checking a computer for you?

P Smith
Cheam, Surrey

Should computers be treated differently to sophisticated hi-fi equipment, cameras, or even washing machines, which non-specialist shops have sold for years? If you want over-the-counter expertise, then stick with the specialist shops, but restricting micro sales to them would be unnecessarily elitist, wouldn't it? — Ed.

Colours run in cross-channel epic

I had the same problem as Robert Crowe (Routine Inquiries, Issue 46) and found a couple of cures. First leave the AFC on the TV tuner switched off when using the computer. You may have to re-tune slightly now and again, also when switching on.

If this method is not possible, fit an in-line attenuator on the computer to the TV aerial lead. Finding the right value is a matter of trial and error, therefore a variable attenuator would be best.

If this is not available, get a 2DB, 6DB and a 12DB, try them individually, or mix and match. This method does degrade the picture quality, but the true colours do hold much better, and it's cheaper than buying a new TV.

Finally, a plea to fellow readers. I am looking for a super-dupa Breakout-type program on the 48K Spectrum, similar to the Commodore version. Can anyone help?

J V Carrana
Mitcham, Surrey

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WRITE TO: Random Access, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

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Write to: Routine Inquiries, *Personal Computer News*, VNU. Evelyn House, 62 Oxford Street, London W1A 2HG.

Oric database tape storage

Q I have written a database program for the Oric-1, but I can't work out how to deal with cassette file-handling. Can you tell how I can save information on tape?
Tim Hiorns, Peppard, Oxon.

A How did you write the program without dealing with saving data to a mass storage device?

It's a pity, because neither the Oric nor the Atmos have any proper file-handling facilities (nor are these available on the Oric disk drives).

The best you could hope to do would be to save an array to tape, which could be loaded in at the start of the program if necessary.

Machine code routines to do this were given in the 'Oric Owner' magazine, Issue 2 (contact Tansoft, Units 1 & 2, Techno Park, Newmarket Road, Cambridge (02205)-2261/2/3/4 for back issues).

There are facilities to do the same things in version 1.1 of the Oric ROM. If you can afford it, you could have your Oric upgraded to an Atmos: contact Oric Products International on (0990)-27641 for details.

If you have some £100 to spare, you might consider ITL's disk system. This provides numerous extensions and improvements to Oric Basic, as well as giving sequential or random access files, which you need for your database. Such a system would mean that you could have a much larger program with more facilities because you would keep all data on disk, not in RAM. ITL can be reached on (0634)-815464/409433.

Putting an interface to a name

Q Please tell me the differences between the numerous different kinds of interface we hear about in *PCN* (IEEE, parallel, serial, RS232 etc) apart from the pin and socket configurations.
Graeme Tweddle, West Rainton, Co Durham.

A Interfaces fall into two main categories, parallel and serial. These two are then split up into different standards that have been specified by various international decision making bodies over the years.

First let us define our terms. An interface is a device or system that allows information to be transmitted from one device to another, computer to computer or computer to printer etc.

Since computers deal with their information in parallel blocks knows as bytes, it is convenient to transmit and receive data from and to a computer in these bytes. A system that does this is a parallel interface. Some common parallel interface standards are IEEE/HPIB (specified by the Institute of Electrical and Electronic Engineers in the USA and used mainly by Hewlett Packard) and Centronics (a common printer connection defined by the Centronics company, which manufactures printers).

The IEEE standard allows data to be transmitted in both directions and uses a definite set of protocols (instructions saying where the data is going to, coming from etc). The Centronics is for one-way transmission from a computer to a printer, again using a defined set of protocols.

Some things to note about interfaces is that they must follow a set of rules that both the sender and receiver obey and they need a set of parallel wires (the same as the number of bits in the byte) to be transmitted along. The latter limits the distance over which data can be sent, due to cost and corruption.

Serial interfaces take the parallel data byte and split it into its component bits. These are then transmitted down a single wire one at a time. To help the receiver decode them, sets or packages are sent and defined at their beginnings and ends by stop and start bits respectively. They are also sent at a preset speed that both the sender and receiver clocks follow.

The most common serial standard is the RS232 or V24. This standard specifies the cables, voltages and currents to be used and not the arrangement of the data transmitted. Most RS232s in use in these enlightened days do conform to a data standard of sorts. The parameters that need to be specified are: Baud *rate* (speed of transmission 75, 300, 1200 etc), *parity*, even or odd (these are used for detecting errors in the data).

An even parity bit is set if the number of bits set to one in the byte is even and vice versa for odd parity), the data byte length (5, 6, 7 or 8 bits) and the number of stop bits (these inform the receiver when the whole byte has been received). The advantages of serial transmissions are that they use a single wire and they can be used over fairly long distances. Converting the serial voltage levels into frequencies allows the data to be transmitted over telephone lines and hence satellites etc.

This is why printers can be either serial or parallel devices but modems are always serial.

Too tough for Routine Inquiries

Nobody's perfect, and *PCN* staff have a continuing reminder of this in the shape of the Routine Inquiries page. It's not that the answers are wrong, but that, every now and again, we get a real toughie, like 'how do I interface my Aquarius to my secondhand Routemaster bus', and how many angels fit on the prongs of a Z80 chip?'

So to break the routine, we've decided to throw you a few curves. First off the mark is G M Charnick, of Hornchurch, Essex. If you can help him, write to Subroutines, PCN, 62 Oxford Street, London W1A 2HG.

Q I recently purchased, for 50p, a computer printer from a local junk shop. Following a close inspection the majority of parts appear to be present. There are however a number of questions I wish to ask:

- **Have you ever heard of a printer called Comprint Model 912 made in America by Computer Printers International?**
- **Inside there is a 'Serial I/O' — is this an RS232 or other similar device?**
- **I think it may be a thermal printer as I have found small pieces of silvery paper inside. On power up the machine works for line feed etc, but appears to lack any printing mechanism. If anyone knows anything about this printer or where parts may be purchased I would be most grateful.**

Newbrain pages saved separately

Q I am writing a very simple word processor program for my Newbrain, and want to be able to SAVE and LOAD separate pages on tape. The method I'm using is very slow — can you advise me?
David Muir, Bourne End, Bucks.

A It is possible to read and SAVE a page line by line. The important commands are PUT5 (send line) and LINPUT=0,A$ (read line). PUT12 sets the cursor to the top line. In the program listing below, lines 1000 to 1030 deal with SAVEing.

Recovering the file is similar, and is dealt with by lines 2000 to 2040. Note that line 2010 is simply a trap, placed there to allow you to accept or reject a file when the filename is displayed.

```
1000 CLOSE#1:OPENOUT#1,1,"filename"
1010 PUT12:FORa=1TO99
1020 PUT5:LINPUT#0,a$:?#1,a$
1030 NEXTa:CLOSE#1

2000 CLOSE#1:OPENIN#1,1
2010 INPUT("ok?")a$:IFa$="no"THEN2000
2020 PUT31:FORa=1TO99
2030 LINPUT#1,a$:?a$
2040 NEXTa:CLOSE#1
```

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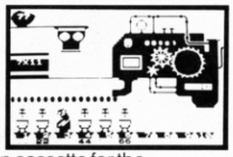

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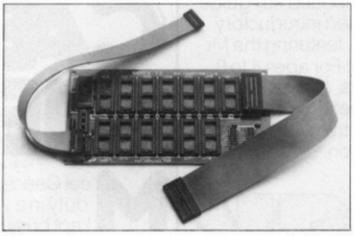

This GCC designed add-on enables the user to increase sideways ROM capacity from the basic 4 sockets up to the full 16, which is capable of support by the current operating system.

- Mounts inside the lid of the BBC computer
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BBC loses half its memory

If you have a BBC micro with 32K of memory and wish to test a program to see if it will run in 16K, entering the following will effectively halve the memory:

PAGE = 0 <RETURN>

10REM <RETURN>

Then press CTRL + BREAK

The message on the screen should confirm that you have only 16K. Unlike lowering HIMEM, this affects the whole memory map and is unaffected by BREAK.

D Clifton,
Beckingham,
Doncaster, Yorks

(**NB** The same effect can be achieved by using the *FX254,0 then CTRL+BREAK. It can be reversed, either by turning off the machine and then on by entering *FX254,255 and CTRL+BREAK — *KG)*

Reward routine for arcade games

The following is a short machine code routine for the Commodore 64 home computer. It is the ideal graphic reward for gaining an extra life, for example, and is well worth typing in if only for a look.

After you have typed in the program and run it a few times, to get the same effect on the border type, as a direct command or otherwise, POKE 79163,33. Alternating between these two versions can produce nice effects indeed, for example:

9999 SYS49152:POKE49163,32:SYS49152:POKE 49163,33:GOTO 9999

This sort of thing could be used in arcade programs to show you've hit the mother ship, or that you're going on to the next level, have got an extra life etc.

While the routine is being executed (either version) hold down a key. Even nicer eh! Unfortunately I could not produce this without having a key pressed.

D Rossiter,
Paignton, Devon

```
5 COUNT=0
20 DATA 0,222,164,0,164,0,166,0,
        232,76,22,192,142,33,208,
        228,0,240,3,76,6,192,96
30 DATA 234,164,0,200,234,196,0,
        240,3,76,24,192,76,10,
        192,0,0,0,-99
40 READ D
50 IF D=-99 THEN 100
60 POKE 5A+COUNT,D
70 COUNT=COUNT+1
80 GOTO 40
100 PRINT"CLEAR SCREEN:
    FINISHED TYPE 'SYS
    49152' TO GO"
110END
```

Larking about with the Electron

I am glad to say that I am one of the lucky few who has actually got an Electron. I was playing about with the memory locations and noticed that, if you type ?&FE07=2 you get interesting results. Try keeping your finger on the RETURN key.

The Electron does not accept *TV255 as the BBC machine does, so if any commercial organisations are reading this, moving the picture down a bit wouldn't do much harm would it?

Philip Yau,
Aberdeen,
Scotland

Organising BBC memory space

The BBC has the valuable feature of being able to load programs into any part of RAM by setting the pointer PAGE. In this way more than one program can reside in memory at any one time. Although this works for loading from cassette, it does not work for entering programs from the keyboard. Entering PAGE=&something, AUTO, causes the machine to hang up after the first carriage return. The only way out is to press BREAK which resets PAGE.

This is particularly frustrating for users of the DFS or TFS (Teletext Filing System) as the system comes back with PAGE set higher than the usual &EOO.

The problem lies partly with the RAM initialisation. After a BREAK, the PAGE pointer is reset to the default value for the current filing system. If the RAM is empty, the first two locations from PAGE hold &D, &FF. The first byte in each page holds &FF and all other locations &0. Thus when PAGE is moved to another boundary, the first byte is &OD. The simplestway of solving the problem is to enter NEW after PAGE has been reset. This sets up both the RAM and the system pointers.

So if you want to enter programs into clean memory at a location other than the default PAGE, remember to use the sequence PAGE= . . ., NEW, then either EUTO or line by line entry.

David Abbot,
Horsham,
Sussex

Memotech LOADing and VERIFYing

Cassette storage on the Memotech MTX series microcomputers is very reliable, even at 2400 baud. There is, however, a bug in the VERIFY routine which may lead one to question this reliability. It is possible for programs to be SAVED in such a way that they will LOAD properly later on, but will not successfully VERIFY.

To overcome this, proceed as follows: When ready to SAVE a program, first place a tape in the recorder which has on it an MTX program, different from the one in memory — any will do. Now type VERIFY"" (Return) and start the tape. The MTX will attempt to VERIFY the first program it finds on the tape and should quickly return a 'Mismatch' error message.

You may now remove the tape from the recorder and insert the tape onto which you wish to SAVE your program, making sure that the tape is correctly positioned. Press the CLS key to clear the Edit screen and SAVE the program as normal. You should find that the program now on tape will VERIFY correctly.

It is perhaps also worthwhile mentioning that when VERIFYing programs it is always advisable to leave the filename out of the command, using the null string as above. This because the BRK key will not function during VERIFY; consequently, if the filename should be mistyped and not noticed before Return is pressed then, unless the program actually exists on the cassette, the only recourse is to reset the machine, losing the program in memory.

VERIFY"" can always be terminated by supplying the MTX with a different program to verify and awaiting the "Mismatch" error.

Steve Benner,
Caton,
Lancaster

Defining TAB on the BBC micro

One way of putting the TAB key to use on the BBC micro is to redefine it using the *FX 219 command. The syntax is *FX219,X where x is the ASCII value to be returned. This key can be converted into a function key by using *FX219,128+n where n is the function key number. n should be in the range of 0 to 15. You can now define the TAB key using *KEYN . . . as usual. If you want TAB to act as the escape key, try *FX219,27.

The escape function can be moved to any other key using *FX220,n where n is the ASCII code to which you wish to transfer it. For example, if you type *FX220,65 (ASCII code for A) then pressing the 'A' key will generate an escape code. This can be useful for setting up a safer escape key system.

J Wise,
Hadley Wood
Barnet, Herts

Escaping the loops in Abersoft Forth

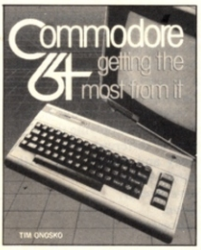
Users of Abersoft Forth will know that once the computer has started executing a loop, control cannot be regained until the loop has ended. However, if the user defines the word ESCAPE as follows:

```
: ESCAPE
    ?TTERMINAL 1 = IF
    ABORT
  ENFIF ;
```

and includes this word within any loop, control of the computer can be regained at the end of a loop cycle by pressing any of the Break keys. Although the computer acts as though it has just been warmed, the screen contents will still be intact.

Michael Perris,
Great Bookham, Surrey

Suffering from keyboard finger? Take a break with a book.



'Commodore 64: Getting the most from it' by Tim Onosko, published by Prentice/Hall International at £7.95 (paperback, 303 pages)

Yet another independent supplement to Commodore's own reference manuals to the 64 but this is definitely one of the best.

Here, you get product reviews although restricted to best sellers. The common feeling seems to be that this shouldn't be done as products come and go, but as most computers have a selling life of only a year or two, why not give the reader all the help you can?

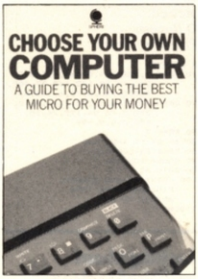
Tim Onosko does this by looking at word processors in general and four of the best-sellers, plus a good look at expanding the system with disks, printers, software applications and more advanced languages.

Finally, one of the best features of the book is a group of three appendices by experts in the fields of Commodore hardware, graphics and sound: Jim Butterfield, Paul Schatz and Frank Covitz respectively. Butterfield's contribution is a tour of the 64 memory map and how to program different configurations of RAM and ROM.

Schatz gives a lucid and helpful look at graphics, sprites, high resolution and character design with three excellent programs including a mind graphics language.

The final chapter on sound is simply the best introduction to sound synthesis on the 64 available. Covering not only the hardware but the theory of sound in easy-to-follow language, Covitz finishes with a handful of sound effect programs you can include in your own games.

With a good index to tie things up, this brings to four my list of essential books on the 64, joining the *Programmer's Reference Guide*, Pete Gerrard's *Using the 64* and *64 Machine Code Master* by Lawrence and England. **PW**



'Choose your own computer', edited by Peter Rodwell, published by Sphere Books at £1.95 (paperback, 192 pages).

This is a reasonably-priced catalogue of most of the mainstream micros available at the time of its writing. There is a new computer release every week (at least). It's therefore important to remember that, with the best will in the world, there is no way a book publisher can provide a comprehensive guide of this nature. It is out of date even before it hits the shelves.

Obviously there is no mention of the new QL, but there is mention of the now defunct Jupiter Ace.

That said, at £1.95, this is professionally edited, and a worthwhile investment — just make sure you supplement your research material with a few current magazines and the sales literature as well.

The meat of the book comprises a two page spread on each of the 76 machines listed, complete with black and white photo, short blurb, technical specifications and price.

This section is sandwiched between a short introduction on the technologies involved at the front and glossary of terms and list of manufacturers at the back.

If you don't buy it in the next few weeks, wait for an updated edition. **IS**

5 Epson RX-80 PRINTERS TO BE WON

Not only do you get a free guide to printers over the next three issues of Micropaedia, but also a chance to win one of the best printers on the market: Epson's RX-80. Your task here is simple: during the next three weeks in each issue, we'll print a list of four printing terms and four definitions, so after three weeks you'll have 12 definitions and terms. All you have to do is match the terms to the definitions. The first five correct entries drawn will win a printer, and your entry form will be in Issue 52. And remember, a term appearing this week may not have its corresponding definition in this issue.

TERM	DEFINITION
Line feed	A set of special non-standard characters which can be used to generate special functions on a printer.
Form feed	One of set of hardware switches that control the behaviour of a printer.
DIP switch	A mechanism for putting paper into a printer one sheet at a time.
Fanfold	A device which quickly takes information sent from a computer to a printer and holds it until the printer can print it all.

Our record stores now come complete with Hunchbacks, Hobbits and Manic Miners.

Fleets of computer games have invaded your local HMV shop. This is just a selection of what you'll find. So get here now and prepare for battle.

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Simulation by

Kenn Garroch investigates the niceties of an almost-IBM- compatible,

Jay Myrdal

The Sanyo MBC 550 has been brought out at a time when the magic words 'IBM compatibility' are all the rage. Since the machine runs MSDOS 1.25 it's a safe bet that there will be large amounts of business software available for it.

The system comes with a bundle of Micropro software that will make it very attractive to commercial users, considering its price (£699 ex VAT for the single drive version, £899 for dual drives), and as a commercial machine it appears to be a good proposition, even though it is *not* directly IBM compatible.

Presentation

The system comes in a sturdy cardboard box and is well packed with the usual polystyrene foam that can be used over again for transportation. There was a little difficulty getting the system out of its box as this is a four-handed job — I am one of those unfortunates with only two so it was a bit of a struggle.

Once out of its box and packing the machine consists of two parts. The keyboard and what the user guide calls the 'mainframe'. This conjures up pictures of rooms full of flashing lights and whirring tapes. The reality is a little disappointing and looks a lot like a video cassette recorder.

The monitor, an RGB colour display (with colour correctly spelt on the facia), came in a larger box. This was a lot easier to extract but nevertheless well packed: this sits on top of the mainframe box producing a neat, if tall, workstation.

Documentation

The review machine came with only one manual, the Sanyo Operator's Guide. This may have been a provisional issue since there are a few things missing. Sanyo will include an introduction and manuals for the Micropro software that comes with the machine.

There is a note in the back of the user guide to the effect that additional manuals are available from 'your Sanyo dealer'. The list of additional manuals includes such things as the Sanyo Basic and MS DOS manuals.

The user guide contains sections on setting up the machine, connections etc. These instructions are fairly good and most people will be able to get the system up and running without any difficulty. The only connections that need to be made are to plug the keyboard and the monitor into the main processor box. Then just put the system disk into the drive and switch on.

Also included in this volume are a glossary of terms, Sanyo Basic and MSDOS as well as a technical reference guide.

Keyboard

The MBC comes with the usual separate, plug-in, keyboard. This is set out as three sections, the function keys on the left, the main qwerty keyboard in the centre and a numerical and cursor keypad on the right.

There are five function keys which can be shifted to obtain ten functions. Basic allows 20 keys to be programmed and, though the manual doesn't say so, the keys 11 to 20 are accessed by pressing the control key and one of the number keys at the top of the keyboard. These keys 11 to 20 seem to be used only in Basic although there is probably no reason why they should not be used in other system programs.

Keys 1 to 10 are used in Wordstar to access some of the more common commands. The keys can contain up to eight characters, enough for simple commands but not for complex Basic sequences.

The main keyboard is distinguished by its overlarge RETURN key and takes a little getting used to as the standard layout is spoiled by some terrible positioning of such keys as SHIFT and RETURN. There are two 'lock' keys, the graph and caps (called LOCK). When the the latter is on (denoted by its bright red LED) pressing shift gives lower case. Both the caps and graph lock keys have these LEDs but the num lock seems to have been ignored when the manufacturer was handing them out.

The numeric keypad doubles as a cursor control point. From the business point of view, the pad has all the usual operators (=/*−+ and its own RETURN). Unfortunately these have been set out in an odd way, with the arithmetic operators at the top, instead of the bottom. The red BREAK key is situated at the top right hand corner of the pad. This is used to perform the same as CTRL+C and when used in Basic causes a deep burping sound to be emitted. This is

the system's 'bell' sound and invites funny looks from other occupants of the room.

Overall, the keyboard is rather tattily constructed and the space bar has a tendency to squeak. This can be annoying, or keep you awake depending on your disposition (Sanyo told me that this shouldn't happen and is probably an oddity of the review machine). The bottom of the keyboard case appears to have been made out of tin plate, the top is plastic, imitation brushed aluminium. The review machine had a shocking tendency to pick up a static charge on the bottom of the keyboard, 'rather disconcerting', I thought after earthing it a few times.

It seems a shame that Sanyo couldn't provide a better keyboard.

Display

The MBC 550 is able to drive two monitors, an RGB and a monochrome. The manual states that the output for the latter is a connection for a 'high-resolution composite monitor' so either this puts out a composite video signal or is a bad Orienglish translation. The former seems more likely as different shades of green were apparent on the monochrome monitor used for the test.

The picture on the Sanyo RGB monitor, supplied for the test, was steady and the colours bright and clear.

The screen access speed appeared to be generally slow and at times very slow, especially with Wordstar. The graphics available from Basic contradict the above statement since the fill command is slick and speedy. It looks as though the version of Wordstar has been badly converted from the original, as is currently the norm for 16-bit machines.

The colours available are blue, green, light blue, red, purple, yellow and the two non-colours black and white. There are DIP switches within the main case that allow the colour output to be altered for monochrome monitors.

Storage

The whole system is disk based and the test machine was a single-drive model. The disks used are single-sided double-density, and a single disk supplies 156K of storage of which 138K is available for use by user files. When using Wordstar, this gives room for a document of about 2500 to 3000 words plus its backup. This is not a lot and it would be nice if there were more.

The test machine having only one drive, has its problems. It is possible to copy whole disks using the diskcopy utility. This asks you to exchange the disks three times as it does the copy and takes about a minute to do a whole backup. This is pretty quick but when you're used to using two-drive systems, it is a bit tedious.

One very annoying thing about the single-drive version of the MBC 550 was the total lack of a facility to copy a single file from one disk to another. Sanyo says it is looking into this and an additional copy utility should be available soon. Apart from this, the MSDOS disk operating 21▶

Sanyo

Sanyo's disk based MBC 550.

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◀19 system has most of the standard commands.

A final thought, while on the subject of disks, is the system clock. Don't take this as being accurate, especially if a great deal of disk accessing is going on. The clock is stopped every time the disks are accessed making it lose time.

Software

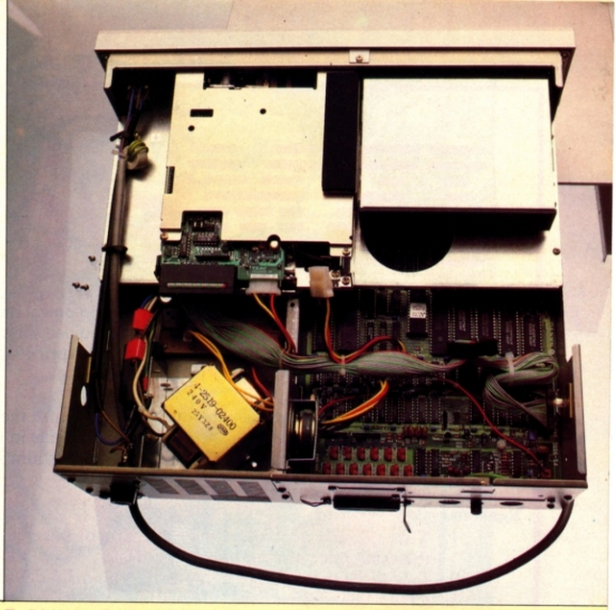
Bundled software is becoming the 'in thing' and the Sanyo MBC 550 is no exception. Included with the double-disk machine, besides MSDOS, are Wordstar/Mailmerge, Calcstar, Datastar/Supersort, Reportstar and Sanyo Basic. The single-drive system comes with only Wordstar and Calcstar plus an introduction.

The above Micropro packages have been adapted from their originals to run on this machine. The Wordstar, with which this was written, appeared to have been badly converted from the original 8-bit version. It is dreadfully slow at updating the screen, though the disk access seemed to be about normal speed. There is no WSCUSTOM file included, instead there is a Basic program that allows the screen colours to be altered. An addition to the normal Wordstar is the user definable keys. These allow common procedures to be carried out at the push of a button. The contents of the keys are displayed at the bottom of the screen to stop you guessing what they do.

The Basic supplied with the system seems to be a fairly standard Microsoft version, although it is called Sanyo Basic. All the usual functions and commands are here plus a few more such as PACK$ and UNPACK$ which convert ASCII strings into strings of ASCII code numbers. The graphics facilities are good with built-in commands for drawing squares, circles, lines etc. There is also a nice fast PAINT command which makes one wonder why some of the other screen handling routines are so slow.

The documentation supplied with the Basic is rather poor and does not cover all of the reserved words or file handling.

The operating system is MSDOS and will probably be one of the main selling points of the machine. There are not many systems of this price that run MSDOS, giving easy access to large amounts of business software. The documentation for the operating system is again, incomplete; just enough to get you going.



The disk drive is on the left and a disk storage slot takes up the space normally occupied by the second drive. Obviously a limitation with this sort of IBM/MSDOS concept is that though you get a reasonable number of tried and true programs ported over by the distributor to run on the machine, you don't get IBM-type expansion slots which would enable you to configure some of the growing range of third party IBM peripheral cards.

Interfaces

A number of interfaces are available 23▶

The keyboard has a standard layout though users with more experience on micros than typewriters may find the ">" "<" appearing when a shift is executed. Though it looks fairly respectable we wonder how much heavy-duty use it could stand as it feels flimsy.

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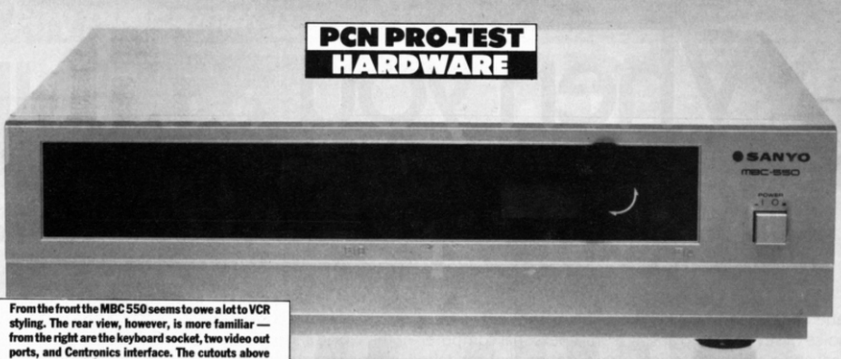

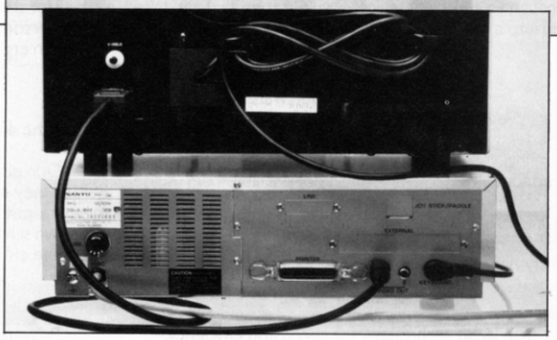

From the front the MBC 550 seems to owe a lot to VCR styling. The rear view, however, is more familiar — from the right are the keyboard socket, two video out ports, and Centronics interface. The cutouts above promise more to come.

◀21 including one for a joystick. On the review machine, only the printer, a Centronics connector, the monitors and the keyboard interface were fitted. The RS232 link is extra though there are fitting instructions given in the manual. There is what the manual terms an external interface. This will be probably used for future expansion for such things as extra disk drives, extra memory and other peripherals.

It is possible to upgrade the memory internally, from the standard 128K, in steps of 64K, to 256K. Again, instructions are given in the manual for doing this. Upgrading the single-drive version of the machine appears to be fairly straightforward, needing only the new drive. All the connections appear to be internally available.

The MBC 550 does not strike me as a games machine, but since it has the capacity to use Apple-type joysticks, the manufacturers must have this possibility in mind or they've got mouse fever). It is true that some games machines are equally as expensive and, I suppose, a business user probably enjoys a good alien zap as much as the rest of us (even though they are loath to admit that such things go on in the industrial empires of the nation).

In use

Operating the MBC was a little odd at first as it took a while to get used to the keyboard (and its squeak). One thing I would recommend, if you can afford it, is a twin disk version. The single disk fills up far too fast and transferring files is a problem. The other problem is the disk access light. This appears to go off only when the machine is reset or drive B is accidently selected.

One thing the mainframe does have is a cooling fan. I arrived at this conclusion because of the amazing racket it made. In a noisy office this may not be too bad but in a quiet room it sounds as though the power is being supplied to the system by a diesel generator with a faulty silencer. As with the faulty keyboard, Sanyo says this is a one-off and due to the machine being moved around a lot.

Some of the system's good points are its size, and the positioning of the power switch. The former is about the size of a smallish video cassette recorder, the latter is at the front of the case, not stuck at the back. You do not need to be a contortionist to switch on the machine.

Overall the machine ran well and without any hitches. One word of warning to those of you who like to type ahead, the keyboard buffer appears to be rather limited and typing while disk access is going on causes letters to be missed.

Support

Sanyo seems to have a dealer network set up to cover this machine. Both Logitech and SDC will be dealers and as soon as all the software arrives from Japan the machine should be up for sale.

Verdict

The Sanyo MBC 550 is a nice machine, for the price. The fact that it includes most of the business software anyone would need will make it very appealing for business applications. Most users will find the single disk version a bit limiting and those who have had experience with other machines that run Wordstar etc will probably find its slow speed a little irritating at first. This does not appear to be the MBC's fault, it is more the fault of the porting of the software from other systems.

Whether the keyboard will stand up to the hammering of constant use can only be answered in time. After using it for a couple of hours you do tend to adapt to the idiosyncracies of any machine and I suppose this keyboard is not too bad. It could just have been better.

The main thing to note about the MBC 550 is that it is not an IBM compatible. It is more of a cheap vehicle for standard MSDOS. It is pretty good value for money, considering the bundled software, it's ability to run MSDOS and its compactness.

SPECIFICATION

Price	£699 ex VAT includes keyboard, main unit, Software (Wordstar, Calcstar and Sanyo Basic) and MSDOS operating system)
Processor	8088 (3.6MHz)
RAM	128K (expandable to 256K in 64K banks internally)
ROM	8K
Text screen	80×25
Graphics Screen	640×200 pixels
Keyboard	85-key full travel, ten function keys and separate numeric keypad
Storage	Single 5.25in floppy disk 160K
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Now that you have a Spectrum, what else do you need? John Lettice makes a few suggestions.

All around a Spectrum

It's now possible to connect a Spectrum to a professional daisywheel printer, to Micronet with the aid of the VTX5000, to joysticks, and even to have a choice of storage devices, either Microdrives or the Viscount disk drive.

Howard Kingsnorth

Micros change so fast these days it sometimes seems there's a new one announced every day, never mind every week. And it's often difficult to sort through the information on what's new in micros to find out more about your own machine.

If you've bought a micro recently, your thoughts are probably turning to the kind of games and serious software you want to buy, and the peripherals you can get for it. But where do you start? Over the next few months *PCN* will be publishing an occasional feature giving details of good buys for the popular micros. We'll give you enough information to get a small library of first class software together, and we'll tell you how to go about buying add-ons. This issue we check out the Sinclair Spectrum.

Software

There's so much available in the way of games software for the Spectrum that your problem's liable to be choosing rather than finding. If you want a range of reliable software to start with you could do a lot worse than sticking to the official Sinclair stuff, which was originally Psion, but now includes a few of the choicer offerings from the likes of Artic and Melbourne House.

Planetoids and Space Raiders are fairly standard implementations of the arcade games, but Flight Simulation is one of the best flight simulators available on a home micro, and Scrabble, Backgammon and the chess games can offer pretty mean opponents, even for the experienced.

The Hobbit, from Melbourne House, has gained well-deserved recognition by being included in the Sinclair catalogue, and if you teamed this up with Legend's Valhalla you'd probably have enough adventure to keep you occupied for the next few months.

Even if you don't reckon you like arcade games you should also sample a few of the newer ones for the Spectrum. Atic Atac, Mr Wimpy, Ant Attack and Pssst are all worth looking at. They show what can be done by combining imagination, a good machine and a sense of the absurd.

If your taste is for something slower, try Hunter Killer from Protek, which drops you in a sink or swim dilemma, running a small semi-detached submarine in hostile waters, or have a look at Great Britain Limited, where you have to run the country, or Football Manager, which gives you the rather more important task of taking the team of your choice to the top. Both these latter are oldies, but they're still the best of their kind.

As far as serious software is concerned, the official Psion/Sinclair output is still pretty reliable. Vu-Calc and Vu-File are both far better than you'd think £8.95 would buy you, and Vu-3D provides you with a polished facility for drawing in three dimensions on screen.

Masterfile, from Campbell Systems, is another reliable filing system, and goes some considerable way towards overcoming the limitations of a tape-based filing system. Tasword 2 does a similarly effective job for word processing, and though you won't find it in all that many shops, it's well worth searching for, particularly because it incorporates software to handle a wide and growing range of Centronics interfaces.

Peripherals

One of the reasons the Spectrum is a low-priced introduction to computing is because the basic machine doesn't have much in the way of interfaces. There's no joystick port, neither Centronics nor RS232 interface, and no monitor output. All these limitations can be overcome, but it's really a question of deciding which of them you want or need to overcome.

Your approach to buying peripherals for your Spectrum will depend a lot on what you want to do with the machine. If you're happy playing games you may well just want to get a good joystick, and if you only require a hard copy facility for printing out your programs the ZX Printer fits.

Joystick interfaces

As the Spectrum was launched without any joystick facility, the older games tend not to have any joystick control options built in. A number of companies produced joystick interfaces before Sinclair produced its own Interface 2, so currently there are several different and incompatible standards for Spectrum games.

Interface 2 takes standard Atari type joysticks. It is currently compatible with Psion/Sinclair games, and new games from

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Interface 1 allows you access to a cheap storage system in the form of the Microdrives, but it also gives you a networking facility and access to an RS232 interface.

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other companies are starting to have a facility to use it built in. The Kempston interface is the most established of the third party interfaces, and Kempston has been relatively successful in getting software houses to write it into their programs. Kempston also produces conversion tapes for some of the games not covered.

But you still won't be able to deal with all games unless you go for a programmable interface. These allow you to specify the keys you wish to replace with the joystick, but they have disadvantages. You have to fiddle with the programming whenever you change games, and this can involve loading an extra tape, which comes with the interface. The Stonechip interface is probably the easiest to deal with, but in the long run, as more manufacturers take account of them, you might be better off with the Kempston or Interface 2.

Printer interfaces

Because the Spectrum doesn't support an 80-column display, printer interfaces that drive professional 80-column printers cause certain complications. So before you even think of getting an interface, you need to consider the software you'll be running with it.

Obviously word processing programs should have the facility to deal with professional quality printers built in, but other serious programs are also starting to appear with this feature. Oxford Computer Publishing, for example, produces 80-column 'Plus 80' versions of its Finance Manager and Address Manager programs.

As far as the Spectrum is concerned, printer interfaces come in two varieties — RS232 and Centronics. The 'official' product is Sinclair's Interface 1, which is actually rather more than a printer interface. It incorporates the necessary interfacing for you to use the still fairly legendary Microdrives, along with an RS232. Sinclair is using the RS232 on its new QL micro.

The problem is that RS232 tends to be more complicated to operate than Centronics, so if you simply want an interface to produce quality hard copy, you may prefer Centronics. Which of the many interfaces you get really depends on what you want to do with your printer. For word processing, Tasword 2 allows you to produce a tailored version of the program to work with a range of interfaces, and the Oxford Computer Publishing programs are designed to work with the Kempston interface. In other cases you may find it necessary to use driver software supplied with the interface before loading your own programs and this can, in some instances, be tricky. But once you have sorted out the problem of interfacing your software to your interface, your Spectrum should be able to do anything other micros can with a printer.

Should you need to print out listings, of course, you'll need a screen dump routine to handle user defined graphics. Tapes of these are available for some interfaces: *eg* the Euroelectronics ZX LPrint.

Keyboards

With your pro printer installed you'll quickly realise your keyboard doesn't come up to scratch, and start looking for another. If you've tried, you'll know how difficult this really is. Keyboards can be poorly designed, or they can be backing up mail order waiting lists into the middle distance. So buying a keyboard by mail order is a minefield, unless you've seen the keyboard in the flesh, and unless you know you can rely on the company.

The two most commmon brands of Spectrum keyboard you'll find in use are the Fuller and the DK Tronics ranges. The earlier Fuller model, the FD42, is an effective keyboard, but limited by its lack of a proper space bar and its gruesome looks. The newer FDS has a more standard keyboard layout, and looks a lot better, but Fuller had been advertising it for some months before it actually appeared at the end of last year, so waiting lists at least *were* substantial.

The DK Tronics keyboard is at least available, and is quite cheap. The keys are a little on the springy side, so it's difficult to type at great speed. The main trouble with the unit is there doesn't seem to have been much thought put into the construction. The arrangements made for putting the power pack inside the case are minimal, and if you're not very careful you could find yourself with a highly dangerous case of power pack wobble. With this, and with a number of other keyboards, possibly the only way you'll fit Interface 1 in is with a hacksaw.

Of the newer keyboards that do take account of Interface 1, the most plausible sounding is the Transform keyboard, which is designed so that Interface 1 screws onto the back in the same way as it does with the original case. The Transform keyboard is well designed and of fairly high quality, but its price means it's a textbook case of you gets what you pays for.

Storage

Interface 1 gives you access to the Microdrive, which is the official Sinclair storage method. It has in fact proved to be a fairly troublesome unit, and Sinclair has been amending various points of design.

With around 85K capacity per cartridge the Microdrives are comparable in storage to, and competitive in price with, the more basic disk systems. The way storage is going, Microdrives aren't likely to set the world on fire, but if they drop in price once they're produced in greater volume, they could well wean a few people off tape storage.

Currently, the alternative to the Microdrive is the Viscount disk drive, which uses 100K single sided double density 5.25in disks. Its main advantage at the moment is it's virtually all that's available, but the trouble is, with the new high capacity 3in diskettes becoming popular, it doesn't really shape up against the sort of technology to be available very soon. ITL's Byte Drive 500, for instance, is due to be interfaced to the Spectrum in the near future, and is likely to set a higher standard for storage.

Software
Sinclair Research, Camberley 685311— Planetoids (£4.95), Space Raiders (£4.95), Flight Simulation (£7.95), Scrabble (£15.95), Backgammon (£5.95), Chess (£7.95), Cyrus IS Chess (£9.95), VU-Calc (£8.95), VU-File (£8.95), VU-3D (£9.95)
Ultimate, Ashby de la Zouch (0530) 411485. Atic Atac (£5.50), Pssst (£5.50)

Joystick interfaces
Interface 2, (£19.95), Sinclair Research, Camberley 685311 Kempston interface, (£15) from Kempston, 180a Bedford Road, Kempston, Bedford MK4 88L
AGF Programmable interface, (£33.95) AGF Hardware, Freepost, Bognor Regis, W Sussex PO22 9BR
Stonechip interface, (£24.95), Stonechip Electronics, Unit 9, Brook Industrial Estate, Dead Brook Lane, Aldershot, Hants

Printer interface
Cobra RS232 interface, (£33.50), Cobra Technology, 01-609 3559. Kempston Centronics interface, Kempston, see joystick interfaces. Hilderbay Centronics interface, (£45) Hilderbay, 01-485 1059
ADS Centronics interface, (£34.50) ADS, Portsmouth 823825
Euroelectronics LPrint (Centronics), (£53.48) Euroelectronics, Cheltenham 582009
Interface 1 (RS232), (£49.95), Sinclair Research, Camberley 685311

Keyboards
DK Tronics, (£46.25), DK Tronics, Saffron Walden 26350. Fuller FDS, (£42.45), FD42 (£32.45), Fuller, 051-709 4666. Transform, (£69.95), Transform, Beckenham 6350

Storage
ZX Microdrive, (£49.95), Sinclair Research, Camberley, Camberley 685311
Viscount Disk Drive, (£245), Spectrum shops, Welwyn Garden City 34761.

Kenn Garroch looks at Lisp — not a speech impediment but a language that's been around a while.

Learn to Lisp

Lisp (Literally Thousands of Parentheses) is an old language, of the same vintage as Algol, Fortran and Cobol. This may be one of the reasons why it has been neglected over the years. The implementation dealt with in this feature is for the BBC micro, but there is no reason why the functions given cannot be adapted and modified to suit other systems, as long as the basic core of instructions is similar.

Lisp is generally known as an artificial intelligence language. Since this is such a complex subject, Lisp is taken to be more complex than it really is. In fact, Lisp is as easy to learn as any other language; you simpy follow the rules. Its flexibility allows it to be used in almost any application apart from straight number crunching, though with a little thought even this can be done.

Functions

The main drawback of Lisp is its large and slow use of memory (in interpreted versions). The following series of functions allows disk-based Lisp systems to access the disk storage and execute functions as though they were in memory, giving a great deal more usable memory space. They are designed to enable lists of data to be transferred from disk to memory easily. They are:

NFILE, PUTEXT, EXT, FEXT and ELIST.

The first, NFILE, is used to initialise a new file. The file is first set to contain a NIL, which is used as the end of file marker. LFN passes the file name to be initialised into the function. When the file is opened, the OPEN function returns the 'handle' into the local variable HDL.

The other argument of OPEN, NIL, tells the system that the file being opened is a new file (the same as OPENOUT in Basic). In the same way as the Basic command OPENOUT, the O/S does not check whether the file exists and so will overwrite a file with the same name.

When in use, the file is 'elastic', *ie* the more data put into it, the bigger it gets. This may sound obvious, but if a new file is placed after it, it can't extend — errors will probably ensue.

Now that the file has been created, a function that allows data to be stored in the correct format is needed.

This routine is PUTEXT and is used in the following way:

(PUTEXT *'listname 'filename*)

The two arguments passed into PUTEXT are FN (the name of the list) and LFN (the name of the file). PUTEXT is in two main parts. The first opens the file and then reads down it until it comes to a NIL. CNT1 is used to count the number of READS needed to reach this point, and the file is then closed and opened to 'rewind' it and set the file position pointer to the start of the file. It is then read CNT1 minus 1 times and the list name, from FN, is written into it.

The next thing to do is to write the list, to which the name FN applies, into the file. This is done by attaching a Lambda list to the local variable DUM. Thus when DUM is evaluated it returns the list of FN.

LISP DISK FUNCTIONS

```
NFILE is used to set up a new external file. It is used in the
form (NFILE 'filename)
and defined as:
(DEFUN NFILE (LFN (HDL))
        (SETQ HDL (OPEN LFN NIL))
        (WRITE HDL NIL)
        (CLOSE HDL))
```

```
PUTEXT is a function used to place a list into a named file. It
is used in the form (PUTEXT 'listname 'filename) and defined as:
(DEFUN PUTEXT (FN LFN (DUM)(HDL)(CNT1)(CNT2))
        (PROGN
                (SETQ CNT1 0)
                (SETQ CNT2 0)
                (SETQ HDL (OPEN LFN T))
                (LOOP
                        (UNTIL (EQ 'NIL (READ HDL)))
                        (SETQ CNT1 (ADD1 CNT1)))
                (CLOSE HDL)
                (SETQ HDL (OPEN LFN T))
                (LOOP
                        (UNTIL (EQ CNT1 CNT2))
                        (READ HDL)
                        (SETQ CNT2 (ADD1 CNT2)))
                (SETQ DUM (LIST 'LAMBDA 'NIL FN))
                (WRITE HDL FN)
                (WRITE HDL (DUM))
                (WRITE HDL 'NIL))
                (CLOSE HDL))
```

```
EXT is used to load external lists from named files. It is used
in the form (EXT 'listname 'filename). If the list is not present
then an error will occurr EXT is defined as:
(DEFUN EXT (FN LFN (HDL))
        (PROGN
                (SETQ HDL (OPEN LFN T))
                (LOOP
```

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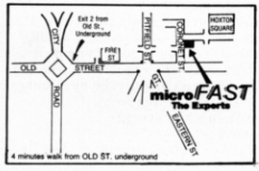

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One of the clever things about Lisp is that functions are themselves lists — the list is preceded with a Lambda and an argument list, in this case NIL, and ends by producing a result. In this case the result is the list of FN.

After (DUM) — the brackets cause it to be evaluated — has been written to the file, a NIL is placed after it to denote the end of the file. The file is then closed.

The next routine to be defined is a function that will extract lists from a file. This function is EXT and is used in the form:
(EXT *'listname 'filename*)

EXT reads the file until it reaches the listname given in the argument. The list is then read in and named with the listname using SET. If the list is not in the file then a message to that effect is printed.

It is now possible to test NFILE and PUTEXT. First enter their definitions and then type:
(NFILE 'FUN)

This will initialise a file with the name FUN. Next enter:
(PUTEXT 'NFILE 'FUN)
This will store NFILE into the file FUN. The next step is to store PUTEXT so type:
(PUTEXT 'PUTEXT 'FUN) to store it. Both PUTEXT and NFILE can now be removed from the OBLIST or object list by entering:
(SETQ PUTEXT 'UNDEFINED)
(SETQ NFILE 'UNDEFINED)
(OBLIST)

The last command will produce the object list to check whether or not they are gone.

Now define the EXT function and test it with the following:
(EXT 'PUTEXT 'FUN)

Typing (OBLIST) will now show PUTEXT back in the system. As a test, use PUTEXT to store EXT in FUN by typing:
(PUTEXT 'EXT 'FUN)

The above routines can now be used to save memory space. The function that does this is FEXT. This routine fetches a stored function from the disk, evaluates it and then removes it from the computer's memory. The result of the evaluation is given as the result. In this way it is possible to have access to a large number of external functions, the trade-off being loss of speed. The function FEXT is used as follows:
(FEXT '*(function arg1 arg2 arg3 etc)* *'filename*)

As an example define FEXT and enter:
(SETQ PUTEXT 'UNDEFINED)
(FEXT '(PUTEXT 'FEXT 'FUN) 'FUN)

This function will load PUTEXT from the disk, use it to store FEXT into the file FUN and then delete PUTEXT. To see whether this operated correctly, the ELIST function can be entered. ELIST gives as its result the contents of a file so (ELIST 'FUN) will evaluate to:
(NFILE PUTEXT EXT FEXT).

FEXT can now be used to store the function ELIST by entering:
(FEXT '(PUTEXT 'ELIST 'FUN) 'FUN)
and the system is complete.

Only the functions EXT and possibly FEXT need be kept in the system permanently. These should be defined, or loaded from FUN using EXT, and then (SAVE 'IM) should be executed. This will save an image file called IM onto the disk. When the system is booted up all that needs to be entered is (LOAD 'IM) and all of the facilities stored on file will be available.

```
                        (UNTIL
                                (EQ FN (READ HDS))
                                (SET FN (READ HDL)))
                        (UNTIL
                                (EOF HDL)
                                (PRINTC
                                        FN BLANK 'not BLANK 'in
BLANK LFN)))
                        (CLOSE HDL)))
```

```
FEXT is used to temporarily load a function into memory, evaluate
it and then remove it. FEXT is used as (FEXT '(function arg arg
arg) 'filename) and defined as:
(DEFUN FEXT (FPAR LFN (R))
        (PROGN
                (EXT (CAR FPAR) LFN)
                (SETQ R
                        (LIST 'LAMBDA 'NIL FPAR))
                (SETQ R (R))
                (SETQ (CAR FPAR) 'UNDEFINED))
                R)
```

```
ELIST is a function that returns a list of the contents of a
file. It is used in the form (ELIST 'filename) and defined as:
(SETQ ELIST
        '(LAMDA
                (LFN (HDL)(DUM)(RS))
        (PROGN
                (SETQ HDL (OPEN LFN T))
                (LOOP
                        (SETQ DUM (READ HDL))
                        (SETQ RS (CONS DUM RS))
                        (UNTIL (EQ DUM 'NIL)))
                        (READ HDL))
                (CLOSE HDL))
        RS)
 Notice that this definition is listed in the alternative way,
 i.e. as a list.
```

Using the functions described above, it is possible to save any type of list in a file. Make sure the files are not too long, since the longer they are, the longer it will take to evaluate the list at the file's bottom. PCN

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Magic Voice comes in Commodore's new colour scheme, as seen on the 64 portable. Note the protective flaps over the cartridge slot and the 'rollers' that ensure a snug fit onto the 64.

Commodore speaks up

Barry Miles is enthralled by the dulcet tones of the Magic Voice.

PCN PRO-TEST PERIPHERALS

Magic Voice, the Commodore speech module announced at the Consumer Electronics Show in America, is expected to be on sale in the UK this month.

Speech is a desirable add-on for many uses, from program prompts and error messages to education and entertaining games.

Magic Voice is only the beginning of Commodore's plans for speech, which include putting it into many Commodore games, typically 100 words and 20 phrases. The well-known arcade games Gorf and Wizard of War will soon be accurate mimics of the original arcade games.

A pre-release version is reviewed here, but it is fair to expect the packaging to be up to Commodore's usual high standards.

Documentation

The 27-page documentation is the detailed American preliminary version, though it may be cut down for Britain. Full explanations of how to proceed are given, and even descriptions of how to connect different monitors/TVs. Programming speech in assembly language is also covered.

Design

Magic Voice has been attractively and thoughtfully designed with flaps on the cartridge port and rollers for ease of insertion.

Setting up

The unit is supplied with a Phono to DIN cable, and connection is straightforward. I used a Commodore 1701 monitor with no problems. Switching on the machine gives the normal sign-on message, and there was no difficulty in trying it out — although some surprise because it's the first time I'd come across a woman's voice synthesised. Commodore says this is because children respond best to female voices and the module it planned is for educational use.

In use

The unit has hooks into Basic, so you can use some new, and almost self-explanatory keywords. Simply type SAY, put your word in inverted commas, and the machine does the rest. Clearly 235 words is a limited vocabulary, but because the words are produced as whole entities they are easily understood, and sound as if said by a person, not a robot.

The vocabulary has been made as wide as possible within the constraints by using some neat tricks. The sound 'ssss', for example, can be used to make words plural, and the 'ty' sound enables numbers to be linked. The sounds can be called up by numbers or by using string variables. DATA and READ statements, together with loops containing SAY commands, can be used to create sentences.

You can vary the speed of the speech by using the new keyword RATE, and you can have a different rate for each word, which enables you to refine the speech.

Provision has been made for programmers who want to synchronise the speech via the keyword RDY; for example, you could type 20 IF NOT RDY THEN GOTO 10 to make the machine wait until it has finished speaking before executing the next line. The Commodore 64 can now execute speech, music, and graphics at the same time, and this form of time control, dependent on the length of the spoken word, is essential if the full capabilities of the machine are to be realised. (How about a singing 64?)

Trying to get the machine to say something not in its vocabulary gives the 'Illegal Quantity Error'. Other error messages are the 'Type Mismatch Error', returned if you give a non-numeric argument to the RATE command, and new vocabulary errors — provision has been made to call them up once loaded.

Verdict

At £50 (compared to the American price of $60) it is competitive with other speech units for the 64 (all of which cost about £20 more than similar products on the Spectrum).

An interesting software cartridge for Magic Voice, due for release this summer, will convert text to speech.

Competition is offered by the Commtalk from AndOr Systems, also costing £50. This has the advantage of using allophones to give it a limitless vocabulary, though they are not as easy to use as text to speech converters.

Magic Voice has been well designed, and does its job attractively. It is certainly a worthwhile addition to the enthusiast's tools, even more so when the converter is released which will make Magic Voice a winner.

Product Magic Voice **Manufacturer** Commodore Computers **Price** £49.95 inc VAT **Machine** Commodore 64 **Contact** Commodore dealers.

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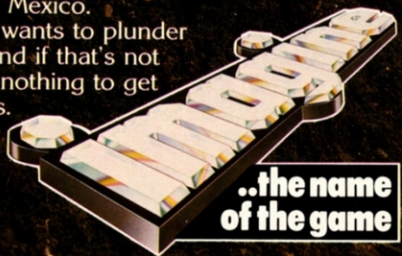

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Interbeeb in control

Victor O'Neill describes how to interface your BBC micro to your household using Interbeeb.

The BBC is not often thought of as a controlling device, but with a suitable interface it can easily become one. In practical terms your BBC could become an anti-burglary device, control your heating and be used for any other electrical control functions with the help of a new interface from DCP Microdevelopment Systems.

The Interbeeb is a self-contained interface, and can also link the BBC to analog-to-digital and digital-to-analog converter packs. This means the electrical signals in heaters and lights, for instance, which are analog, can be controlled by a computer, in which all the signals are digital.

Most interfaces control electrical devices by outputting an analog signal. The digital signal from the micro is converted, and the external device reacts. Converting the signal back again allows the effects of the action to be monitored before the next piece of information is sent out.

The applications mentioned above could be implemented without the use of an interface, but this would require you to take to your BBC with a soldering iron — even with an interface you might have to use one.

The Interbeeb is versatile and easy to use, providing a range of digital input and output facilities and eight analog-to-digital conversion channels, on the BBC's IMHz bus. A socket connection for the DCP bus allows expansion of the interfacing facilities with the DAC pack and the AD pack.

First impressions

All three devices come in smart gloss-black boxes topped with sturdy plastic labels which show the location and functions of the input and output connectors, and give a simplified schematic circuit diagram.

Inside each one are neat and well laid-out printed boards. The Interbeeb is densely packed onto a plated-through-hole board, and several components, apart from the usual TTL gates and buffers, stand out. The 28-pin IC (ADC0809) in one corner is the 8-channel analog to digital (A/D) converter. Opposite that are four relays used to switch higher current loads on and off, and in the centre of the board lies a voltage regulator attached to a fairly large heat-sink.

Setting up

A 400mm length of 34-way ribbon cable attaches the Interbeeb to the IMHz bus, and a separate power supply unit plugs into a socket near the ribbon cable outlet.

The DAC and AD packs plug onto the DCP bus — a 15-way socket on the Interbeeb. This bus is a feed-through connection on the two packs, so they can be stacked end-to-end on the back of the Interbeeb. Their power comes from the 5V supply rail (one of the DCP Bus connections). There's no need (or possibility) for hardware adjustments to the Interbeeb or the two packs.

Documentation

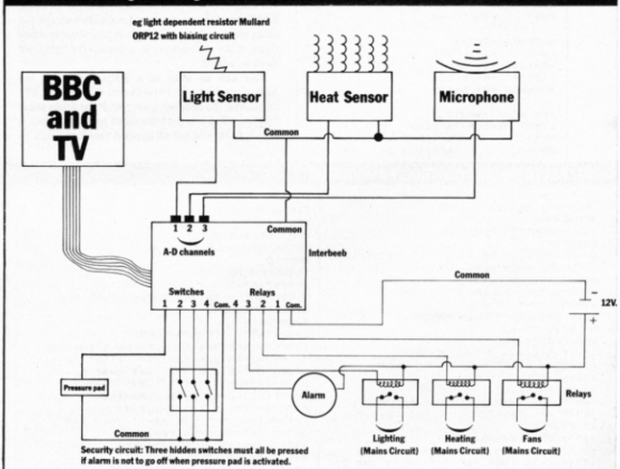
Interbeeb's manual, although provisional, is well written, taking you through each input and output facility, giving examples of applications in hardware, and simple software routines. The DAC and AD packs are supplied with single comprehensive A5 information sheets.

In use

In addition to the DCP bus connector there are five distinct interfacing ports on the Interbeeb: 8-bit digital input and output (both TTL), a four switch input and four relays — each with a common line — and

40▶

Schematic diagram showing DCP Interbeeb in use.



This diagram shows schematically what could be done with the Interbeeb. Most of the boxes shown are themselves small circuits, and they would need to be tuned to fit the inputs of the Interbeeb. The program reflects this in its treatment of the analog inputs.

Coming into the Interbeeb are three signals via the A-D channels, and four signals from the switch inputs. The light sensor gives an indication of how dark it is: darkness gives a low result, light gives a high result on the A-D channnel. The heat sensor works in the same way, giving a low signal when it's cold and a high signal when it's hot. The microphone is similar, giving a stronger signal as the noise gets louder. This would have to be checked against the background noice, or scaled, so that only exceptional noises give results. A pressure pad and three switches give the four switch inputs to the Interbeeb.

Controlled by the four internal relays are an alarm, a lighting circuit and fans. The alarm signal is powered by a 12V battery, but the other three circuits are controlled by the mains. For this reason each one is controlled by a further relay, since mains switching is not something that should be done by either the Interbeeb on the unwary. In theory the 12V supply could be tapped from the BBC's disk drive power supply, but the current could be greater than the BBC would like.

Using this circuit you now have a wide choice of things to do from software: You can use a combination of fans and heaters to control the temperature, the light sensor to turn on lights when it gets dark, the pressure pad and switches as a security system, or the microphone, alarm and lights as a burglar alarm.

The circuit shown here could also be used for other purposes — for example a deaf person could use the microphone next to the doorbell to flash the lights when sonemone rings it. Various combinations of the switches could be monitored to allow for manual switching of electrical equipmwnt from one point.

The range is only as limited as your imagination.

PCN PRO-TEST PERIPHERALS

eight analog inputs.

The digital input and output ports are treated as 8-bit binary numbers which Basic converts to decimal when reading from or writing to them. The switch inputs are also read as a binary number, according to whether a particular socket is connected to the common line or not. The relays are easily switched on and off and can handle loads of up to 1A at 12V (enough for small lamps or toy motors), or be used to energise a larger relay for more meaty applications. The A/D conversions are carried out by a single chip which multiplexes the input signals.

Every function of the Interbeeb and the two packs is easily accessed from Basic by simply writing to, or reading from the device addresses. For instance, the instruction ?&FCC2=n (n is decimal) will generate the binary bit pattern for n at the 8-bit digital output port. The digital input port, relays and switch inputs are all handled in the same straightforward manner.

The AD and DAC packs are equally easy to use. Both feature 8-bit conversions, and the AD pack will operate at about 10 times the speed of the A/D converters in the Interbeeb—although both of them will convert data much faster than it takes Basic to read them.

A small problem came to light here: The voltage references in the two packs (2.55V) and the Interbeeb (2.45V) don't match. This may not seem much, but if you were using the Interbeeb's A/D converter to monitor the response of some external circuit to a signal generated via the DAC pack, you would have to scale the data in software before you could make a meaningful comparison. The problem was cost: a precise 2.55V reference costs nearly five times that of a 2.45V.

Schematic diagrams on the box tops of the Interbeeb and converter packs give easy references to the use of each socket.

The Interbeeb manual includes several academic applications for these interfaces, such as switching LEDs on and off. Since these devices are likely to be widely used in educational establishments, (in teaching circuit design, control theory, electronics etc) these are useful, but not as interesting as using the interface in the home.

Verdict

These three products are excellently engineered; a good concept, well thought out and professionally presented. In schools and colleges they could provide a cheap way to demonstrate the capabilities of the BBC beyond the monitor screen.

Product Interbeeb, AD Pack and DAC Pack **Manufacturer** DCP Microdevelopments, 2 Station Close, Lingwood, Norwich NR13 4AX (0603) 712482 **Price** Interbeeb (inc power supply) £59.95; AD Pack, DAC Pack £19.95 each, all inc VAT **Outlets** Mail order (add £1.95 p&p) from RH Electronics (Sales), Chesterton Mill, French's Road, Cambridge CB4 3NP (0223) 311290; schools/colleges Griffin and George (01) 997 7977.

INTERBEEB ADDRESSES

```
INPUTS DIGITAL
PRES PAD=?&FCC1=1
SW2     =?&FCC1=2
SW3     =?&FCC1=4
SW4     =?&FCC1=8

OUTPUTS DIGITAL
FAN     =1=?&FCC1
HEATING =2=?&FCC1
LIGHTS  =4=?&FCC1
ALARM   =8=?&FCC1

ANALOGUE INPUTS
LIGHT SENSOR ?&FCC0=1 IN 0-255
HEAT         ?&FCC0=2 IN 0-255
SOUND        ?&FCC0=3 IN 0-255
```

The program makes the circuit perform the following functions: If the pressure pad is trodden on and the three switches have not been pressed the alarm bell rings. If the microphone is activated the lights will flash on and off.

This can be used as a burglar alarm if the background noise level is set low or, for example, as a signal that the doorbell is ringing. If the light sensor indicates that it is dark the lights come on. When it gets light they switch off again. A time loop could be used to leave the lights on for a limited period. The heat sensor controls both a fan and a heating system to maintain a chosen temperature. The program is menu driven so that while it's running adjustments to the circuits can be made. Extra circuits can also be easily added to the diagram, and handled by new procedures within the existing program structure. Other uses for the circuits shown can be handled in the same way — *ie* by extra procedure calls within the REPEAT loop running from lines 20 — 80.

INTERBEEB CIRCUIT CONTROLLER PROGRAM

```
1REM (C) KENNSOFT 1984
5PROCMENU
10REM MONITOR PROGRAM
20REPEAT
30IF (?&FCC1 AND 1)=1 THEN PROCPRESS
40PROCHEAT(FNTHERM)
45PROCFAN(FNTHERM)
50PROCLIGHT(FNLDR)
60PROCLIGHT(FNMIC)
70IF INKEY$="M"THEN PROCMENU
80UNTIL FALSE
90DEFPROCPRESS
100IF ?&FCC1=15 THEN ENDPROC
110?&FCC1=?&FCC1 OR 8:REM ALARM
120ENDPROC
130DEFPROCLIGHT(X)
140IF X=1 THEN?&FCC1=?&FCC1 OR 4
145IF X=0 THEN?&FCC1=?&FCC1 AND 251
150ENDPROC
160DEFPROCHEAT(X)
170IF X=1 THEN ?&FCC1=?&FCC1 OR 2
175IF X=10 THEN ?&FCC1=?&FCC1 AND 253
180ENDPROC
190DEFPROCFAN(X)
200IF X=0 THEN ?&FCC1=?&FCC1 OR 1
210IF X=10 THEN ?&FCC1=?&FCC1 AND 254
220ENDPROC
230DEFFNMIC
240?&FCC0=3
240IF?&FCC0>LEVEL THEN =1 ELSE =0
250DEFFNTHERM
260?&FCC0=2
270IF?&FCC0>HT THEN =1
275?&FCC0=2
280IF?&FCC0<LT THEN =0
290=10
300DEFFNLDR
310?&FCC0=3
310IF?&FCC0>BRIGHT THEN=1 ELSE =0
320DEFPROCMENU
330MODE 7
340PRINT"    CONTROLLER"
350PRINTTAB(5,4)"1...Set microphone"
360PRINTTAB(5,6)"2...Set light detect"
370PRINTTAB(5,8)"3...Set heat low"
380PRINTTAB(5,10)"4...Set heat high"
390PRINTTAB(5,12)"5...Monitor"
400PRINTTAB(5,13)"0...End"
410A$=INKEY$(0):IF A$="" THEN 410
420IF A$="0" THEN PROCEND
430IF A$="1" THEN PROCMSET
440IF A$="2" THEN PROCLSET
450IF A$="3" THEN PROCHLSET
460IF A$="4" THEN PROCHHSET
470IF A$="5" THEN ENDPROC
480GOTO 330
490DEFPROCEND
500?&FCC1=0:REM TURN ALL OFF
510END
520DEFPROCMSET
530CLS
540PRINTTAB(3,6)"Make sound level for trip"
550PRINTTAB(3,7)"press space when ready"

560?&FCC0=3
570LEVEL=?&FCC0
580A$=INKEY$(0):IF A$<>" "THEN560
590ENDPROC
600DEFPROCLSET
610PRINTTAB(3,6)"Set light level then press space"
620?&FCC0=1
630BRIGHT=?&FCC0
640A$=INKEY$(0):IF A$<>" "THEN620
650ENDPROC
660DEFPROCLHSET
670PRINTTAB(3,6)"Set low heat level then press space"
680?&FCC0=2
690LH=?&FCC0
700A$=INKEY$(0):IF A$<>" "THEN680
710ENDPROC
720DEFPROCHHSET
730PRINTTAB(3,6)"Set hi heat level then press space"
740?&FCC0=2
750HH=?&FCC0
760A$=INKEY$(0):IF A$<>" "THEN740
770ENDPROC
```

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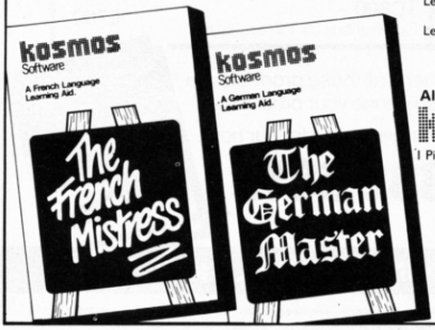

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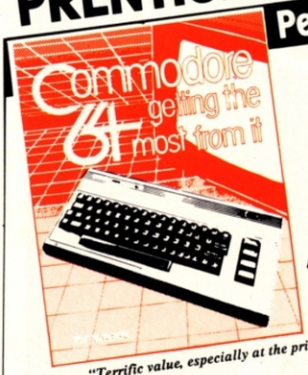

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☐ £8.95 *300 pages* *13-477332-2* *February '84*

By the authors of the highly successful **BASIC Programming on the BBC Microcomputer**, this new title provides a complete introduction to the Electron and to programming in BASIC. While they use the same structure as in their previous book, the Cryers present many new features in **BASIC Programming on the Acorn Electron**: more than 120 screen displays, cartoons, flowcharts and diagrams illustrate the text, which is over 100 pages longer than the BBC micro book; greater emphasis is given to structured programming and good programming techniques; information on graphics has been expanded to show how to get 64 colours on your 8-colour machine, create pie charts and draw in perspective; introductions to flowcharts and to database programs are included.

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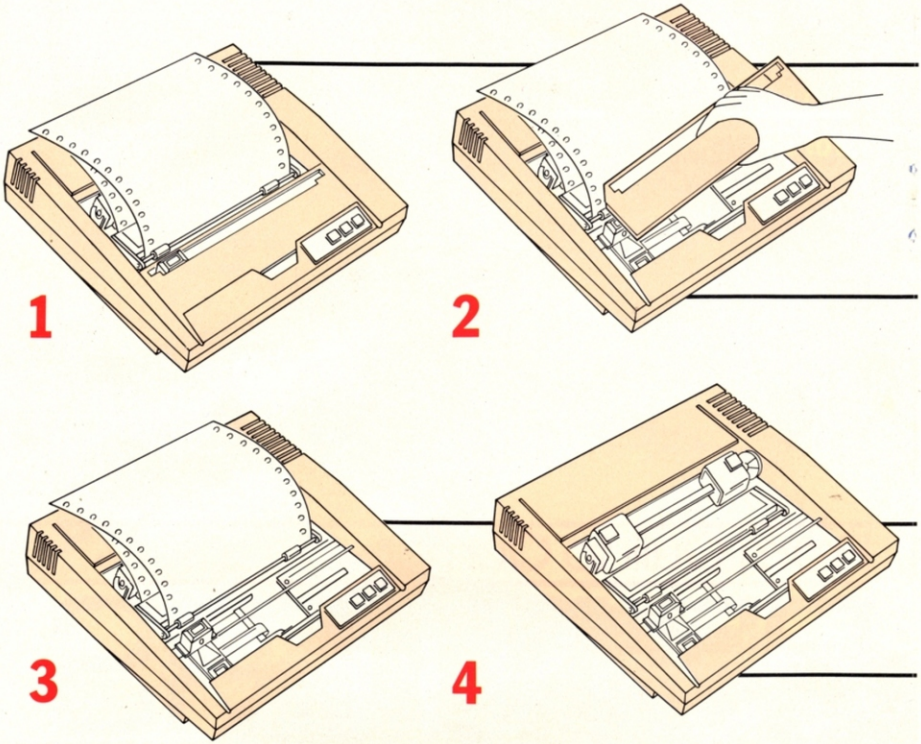


PRINT PROTEC

Printers need more looking after than almost any part of your computer system.

They may be expected to outlive other elements in the system, because generally printer technology does not move along as fast as the technology relating to other components of the system, and therefore you are not likely to upgrade your printer as often as you do other parts of the configuration.

Despite this, you will be well-advised to pay attention to the well-being of your printer. After all, it contains many moving parts compared with other units, and is called upon to perform continuously for long periods, and at high speeds. It is worth remembering that the accuracy you expect from a printer is quite remarkable.

To achieve that accuracy, printer parts must move in a controlled fashion by very small increments: often as low as 1/200th of an inch, which is extremely demanding, especially at high speeds.

Fortunately the machinery is very tolerant. Although you should keep your printer clean and may need to oil or grease it occasionally, the average printer doesn't require much more attention. But many users adopt an attitude of 'out of sight, out of mind', which means a lack of lubrication and adjustment and increased wear.

It is not difficult to keep the machines clean. The first requirement is to have a dust cover, and to ensure that the cover is always on the printer when it is not in use. It will be best if the cover is waterproof, and a seamless version will be better for this reason.

You will be well-advised to ban all drinks, whether alcoholic or not, from the area surrounding the computer and its peripherals, but that is a doctrine of perfection. Some programmers cannot operate unless regularly supplied with coffee, or something stonger.

Some printers are supplied with a cleaning kit. Triumph Adlers are good for

1) There should be some form of dust cover included with your printer.
The first thing you have to do to get inside the machine is to take this off.

2) Once the cover is off the printer you should be able to see the print head and ribbon cartridge. Lift the ribbon cartridge out carefully and put it aside so you can get inside the printer.

3) If you haven't already taken the paper out of your printer, now is the time to remove it. You'll find paper can sometimes jam, particularly from tractor feed mechanisms and that the perforations from tractor feed paper can get stuck in the works of the machine.

4) Now you're inside. Give the front area of the printer a go-through with a can of pressurised air or a camera-lens style bulb and brush taking care to make sure that the travel mechanism along which the print head travels is clear and clean.

TION

this. In particular they supply a brush with sticky bristles, which is great for removing paper dust from the inside of the printer.

A number of suppliers make cleaning kits available, notably Inmac and Action, and these contain a suitable array of fluorocarbon isopropyl alcohol fluid, lint-free cleaning wipes, double ended cleaning wands (like the ones used for cleaning babies' ears, but much larger), and even polythene gloves for keeping your hands clean. You simply go around the insides of your printer using the bits and pieces with a sensible degree of caution, and there you are.

Previous to this you will have removed all the usual debris which gathers in the machine. Tearing off paper fast is likely to have left bits of paper in the machine, and it is surprising how much paper dust can accumulate if your printer is a fast one.

Cleaning a daisywheel printer is a similar task to cleaning a dot matrix machine, but you will find you have more space in which to work. In addition to the inside of the machine itself, there are the extra problems of cleaning the platen and the daisywheels.

In an ideal world there will never be any need to clean the platen (paper roller), because you will never let the printer print onto the roller without any paper in between. However, the world is seldom ideal, and accidents do happen. If your printer has a 'Paper Out' indicator it will stop printing and ring the bell or buzzer whenever the end of the paper is reached.

However, if you are using single sheets for correspondence, as you often are when using a daisywheel printer, you will naturally switch the Paper End Detector off. It is surprising how many characters can be printed onto the platen before you can switch the printer off line. This is particularly true if you have a built-in buffer. The result is a seemingly permanent layer of ink on the roller. This is in fact easily removable by judiciously applied methylated spirits, or surgical spirit. It is best to do this in a well-ventilated atmosphere if you want to remain unaffected by the experience.

It will obviously be sensible to grease and oil the machine with great care, and only if the manual clearly says that this is a sensible thing to do. Adjustments are best left to experts.

Selection of ribbons is a more serious matter than at first appears. It may seem that you should simply buy the cheapest ribbons available for your printer and stock up for the future. This is not the best idea. Firstly, the cheapest may not necessarily be the best. Sometimes the manufacturers supply ribbons which offer less friction than other substitutes, and reduce wear.

If you buy in bulk, you run the risk of the inks drying out before the ribbon is used. This is particularly likely if the ribbon is not sealed in a plastic bag at manufacture. Users in the London area may be able to get same-day delivery, or at least same-day despatch for telephone orders, so there is really no need for carrying large ribbon stocks at all: let the supplier do that.

Some users are quite happy to re-ink ribbons, delighting in painting the ink onto the ribbon, having removed the lid of the cartridge. For most of us this is too mucky a task, and not justified on cash savings alone. If you can afford the printer, then you should be able to afford the ribbons.

Most manufacturers can supply refill ribbons for putting into the cartridge. These represent a material saving upon new cartridges, and with a little practice need not cause you to end up with about 50 metres of ribbon all over the floor.

Daisywheel printers offer a number of additional types of ribbon. For everyday work there is no economical substitute for the fabric ribbon, similar to those used by most dot matrix printers, which can be used continuously until the image fades to an unacceptable extent. For really high quality, suitable for the important letters which must look as good as possible, you will find nothing better than the film carbon ribbon which is used once and then thrown away. This will be expensive, but quality is never cheap.

For an intermediate point, you may find multistrike carbon acceptable. This is quite a clever idea. The ribbon moves along by one quarter of the width of a character after each one is printed, so that you have a good chance of almost every character printing as well as when a carbon ribbon is used.

Unfortunately, the odd coincidence of character succession means that occasionally a character almost completely fails to print. Obviously this is only suitable for less important correspondence. Your choice of ribbon will partly depend on whether you can adjust the rate at which the ribbon is fed according to the pitch you have set on the printer.

More fundamental aspects of the care of your printer are to ensure that it is securely mounted. It goes without saying that it will not take kindly to being dropped, or being allowed to vibrate off its table.

There are some very good stands available at a wide range of prices, which will hold the printer securely, and ensure that paper is fed to the machine, and caught soundly as it leaves the machine. Noise levels and vibration can often be reduced by placing the printer on a rectangle of thick plastic foam.

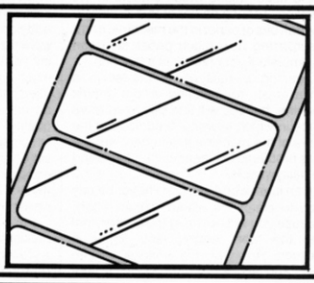
Some care is worth taking to line up the paper between the printer and the box from which it is delivered, and also to the destination, whether that be a mere heap on the table or floor or a catchment tray. If you make sure that the paper is not being pulled sideways at all, you will make it less likely that it will travel sideways on the roller of a friction-fed machine, or climb off the sprockets of a tractor-fed machine. This is particularly important if you intend to leave the printer unattended during long print runs.

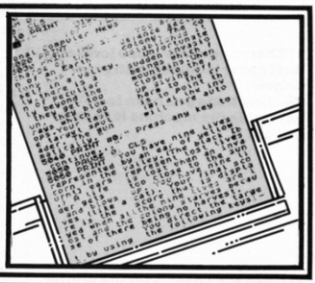
When buying your printer, you will be wise to have a very careful look at the paper transport mechanism. Examine it from the viewpoint of both how easy it is to insert paper, and also how easy it is for the paper to start to misbehave.

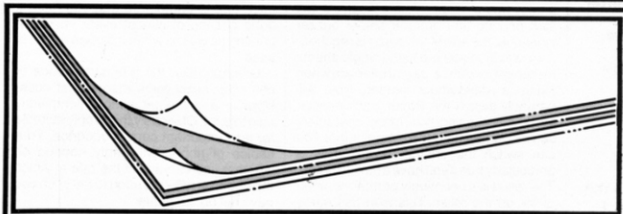
A little caution here will save a lot of aggravation later. If your computer is particularly sensitive to surges in mains voltages, you may find it worthwhile putting a power spike cleaner between your computer and the mains. Otherwise, turning the printer on and off may reset the computer with dire results.

A number of different paper types can be used with various printers. Perhaps the most specialised of these is thermal paper which is sensitive to heat generated by the print-head of a thermal printer. One of the most common is the Sinclair model.

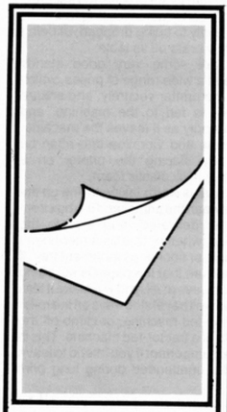
Another special type of 'paper' (right) are rolled labels which can be used with continuous-feed printers to produce many printed lables very quickly.







The diagram on the left shows the kind of leafed carbon paper which is traditionally used with typewriters to make more than one copy of the written product. This is also available for printers in the form of multi-layer listing paper which contains two sheets of carbon sandwiched between three sheets of paper allowing three copies to be printed.



Specially treated paper transfers an imprint from sheet to sheet without carbon. This allows you to reduce the thickness of paper used but is harder to find and more expensive than other paper types.

PAPER CHASE

A wide range of printer paper is available, and it pays you to know what the choices are. If you use a thermal printer, you may want to have some paper which prints black, and some which prints blue. You may also want to know which prints darkest, because exposure to sunlight or indeed to any light leads to fading.

Paper prices are falling as the popularity of printing increases, and the business user is the main cause and beneficiary of the falling prices of the standard sizes and types of paper. For instance, ordinary listing paper is now available very cheaply.

Ordinary paper is about 70 grammes per square metre, which is good enough for most practical purposes, and takes up less room.

Once these basic needs are fulfilled, you may want to go further. Merely increasing the paper weight to 80 grammes per square metre gives a pleasant increase in thickness and whiteness. It feels more substantial, and the print looks darker.

However, it is good sense to get hold of a sample before committing yourself, because the paper transport mechanism of your printer(s) may not be substantial enough for the job. You will also find that paper of this weight will be bulkier when folded, and you need to take this into account when deciding how much will fit into the envelopes you use.

If you need file copies of your output, you have a number of choices to consider. You may be quite happy to print out multiple copies on your printer, which is fine if you don't have too many to produce, and the demands on your printer's time aren't too copious. Obviously it it easier to use stationery which comes ready to provide more than one copy, provided that the time taken to remove ordinary one part paper, and to insert the two or three-part paper, is justified.

The first candidate for multiple copies is the use of 'One time Carbon' duplicates. This is bulky material, and you will have a disposal and cleanliness problem. What you buy is a set of two or three layers of paper, interleaved with special carbon paper which is quite good enough for one single printing, but after that must be thrown away, because it is exhausted. It is also likely to get your hands very dirty, because the carbon is only lightly attached to the paper, and is therefore very easily detached. It is possible to obtain this paper in up to four part format: *ie* top copy plus three carbons. The is seven layers of paper, which demands a lot of your printer.

Alternatives are readily available, in the form of No Carbon Required (NCR) paper.

Firstly the paper is less bulky. As the name indicates, copies are obtained without using carbon paper. The two or more layers of paper are crimped together at the edges, with nothing in between them. In fact there is a 'male' and 'female' type of paper involved. If you are using separate sheets for this function, (a very fiddly task), you need to order the right type. The paper is made with chemicals trapped in the fabric of the paper in micoscopic bubbles. These are invisible and have no effect until the pressure from the print head crushes the bubbles and makes them burst. The different chemicals mix, resulting in a copy appearing on the under sheet. If you are using three part paper, the middle paper is

'female' one side and 'male' on the other. The bottom sheet is female.

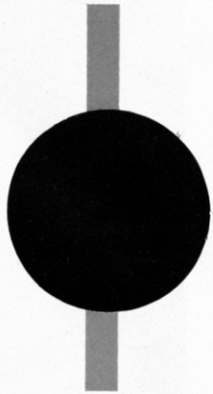
These papers produce very clear copies, especially if you correctly adjust your printer to give the right amount of pressure on striking.

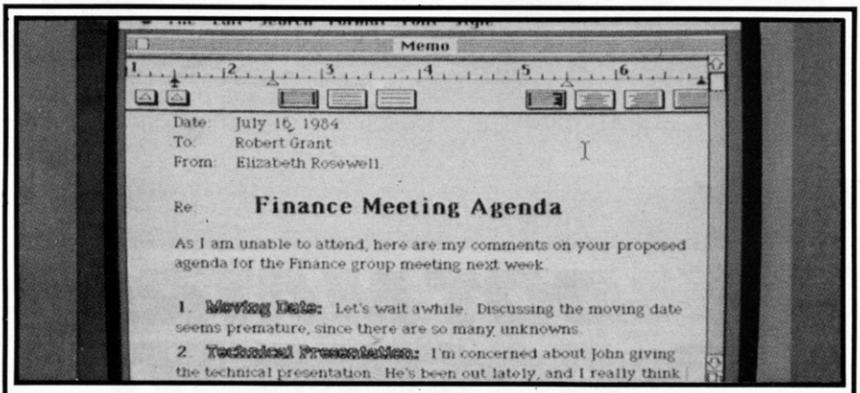
There is evidence of a health hazard. People who do a lot of work with this paper in a confined space have suffered an abnormal level of skin irritation, and respiratory problems, together with some eye irritation.

Turning to labels, it is a good idea to research this thoroughly. Simply decide how many labels you need, find a supplier who supplies in those sorts of quantities, decide how big you want your labels, and order them. As with many things in fact, it's not quite so simple. You must decide whether you want to print labels vertically, one at a time, or whether you want two or more side by side. Does your software permit this degree of flexibility, or are you constrained in some way? Secondly, is the backing paper too thick for your printer? More importantly, how sticky are the labels? This sounds crazy, but the degree of adhesion is something which is designed carefully by the manufacturers, and is of particular interest to computer users. The point is that you can spend lengthy periods removing labels which got detached from the backing sheet and wound themselves around the inner workings of the printer.

There are other tricks available for the speeding up of production of your printed output. You may prefer to have your letterheads on continuous stationery, so as to use a tractor feed to keep the printing in perfect registration. This presupposes preprinted letterheads on your continuous stationery, and gives you a problem so far as sending letterheads which look good is concerned. One way out of this is to have your normal letterheads mounted on strong carriers. Some firms who do this for you, including mounting some of your own existing letterheads, or printing and mounting them for you as well.

If you prefer, you can have micro-perforated letterheads manufactured, (Inmac do this in 5 days). It is difficult to see the paper was in fact torn off. The letterheads can be supplied with a copy attached, and in a wide variety of paper weights.





Word processing is used for a whole variety of purposes, and the qualities required of your printer will vary. Guard against buying facilities which it would be nice to have, but which you'll never use (because the need never arises, or because you can't be bothered to get out the manual and master the necessary control codes.)

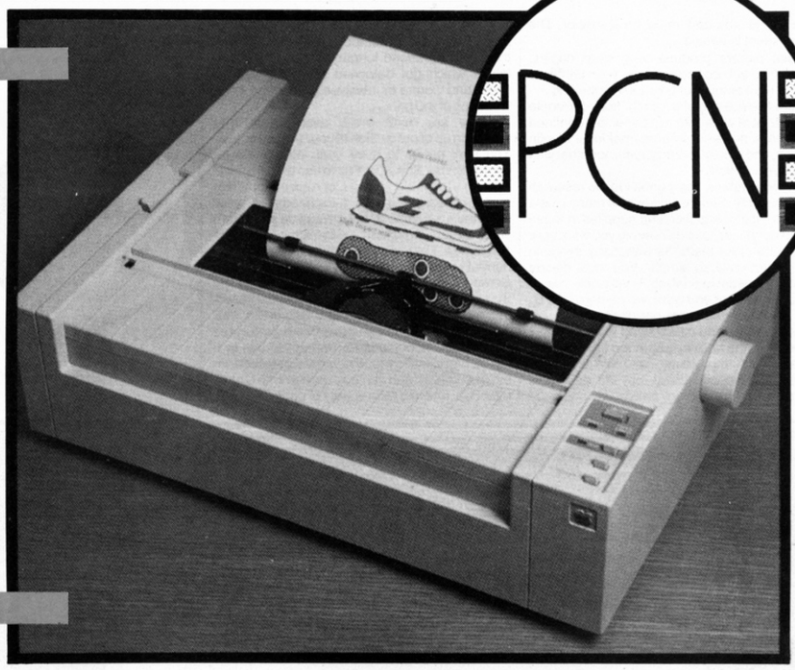
So decide on your priorities. Your final decision is likely to be a compromise, dictated by the current state of the technological art, and by cash. Take the example of an author who wants to produce drafts quickly, and then produce attractive final versions of the copy, but still print it fast: a good dot matrix printer, with a pleasant typeface, or typefaces will do the trick. It should operate at over 160 characters per second, and must be reliable. Along with many other users, the writer should be able to get along without a daisy wheel printer, provided the dot matrix machine will permit double strike or other enhanced modes of printing — which is good enough for all but the most vital correspondence.

The practising solicitor, whose correspondence is a professional shop window, would equally require reliability, but be less concerned about speed: a daisy wheel is the natural choice here, probably with an acoustic hood, unless you are content to use one of the slower, quieter kind, with the possible addition of a buffer.

For the business person who wants fast drafts and reports printed, as well as produce high quality correspondence from time to time, the answer may be a dot matrix printer with an 18-wire head. This will produce dot matrix-type output at 400 characters per second, but for correspondence will cut that speed to perhaps 100cps and produce print of not quite daisy wheel. However, these printers often cost more than a daisy wheel and a dot matrix combined.

You should next go through the various brands and models looking for the various facilities you may require. Proportional spacing may be high on your list of priorities, as may be ease of interfacing with the micro. You may want a built-in buffer, or italic font (typeface) built in, or a wide range of cheap daisy wheels. You should look at the total speed. Often, the rated speed is not the important thing: if you can feed separate sheets into a daisy wheel printer to exactly the right point by pressing one button, this may be more important than the ten per cent or so increase in printing speed. Form filling will be easily carried out if your printer performs upward linefeeds.

You may want user definable characters, so that your printer can print logos on your letterhead for you. You may want tractor and friction feed, or you may want to be able to buy a single sheet feeder at some future time. Fortunately there is an ever-wider range of options available, so with careful consideration you should be able to find exactly what you want.



The Apple Imagewriter printer (pictured above) is one of the more sophisticated and high-resolution dot matrix printers available.

The Imagewriter printer allows you to 'dump' screens from both the new Macintosh and Lisa series of machines — and even incorporate different sizes and fonts of text with graphics. In the picture above you'll seen an image generated on a Macintosh appearing on paper from the Imagewriter printer.

Although the printers can do some wonderful things, they don't come cheap. The Lisa-compatible version of the printer currently costs £423, although the planned Macintosh Imagewriter should be cheaper.

In the circle at the top right of this page you'll see a close-up example of what the dot-matrix graphics from the Imagewriter look like. They are a testament to what can be done with new high-resolution printing mechanisms.

DOT MATRIX DOCUMENT

Dot matrix is the form of printout generally associated with computers.

'Usually' the dots making up the letters are visibly separate. Usually is the operative word because major improvements have occurred recently on printer technology, and the output from dot matrix printers can now be very attractive, and a far remove from the sort of 'personalised' appallingly-printed junk mail, which drops though our letterboxes.

The competition among printer manufacturers is fierce, with the Japanese, notable copiers of other people's ideas, going great guns. And it's all good news for the user.

This competition means even cheaper printers, with ever more facilites. It also ensures a healthy second-hand market as printers become available from enthusiast determined to have the best, or at least the latest.

With a bewildering variety of printers available you are in danger of becoming spoilt for choice. A plan is needed. The industrial espionage business seems to be flourishing in the printer area, which is leading to a degree of rationalisation of design.

Reliability must be high on the list of requirements. By their very nature, dot-matrix printers are the workhorses of computer output. You expect to be able to run them continuously hour after hour, and not to overheat, or break down. For this purpose you will want to go for well-known makes which have been around for some time.

Another major requirement is that the paper transport mechanism is absolutely reliable. Nothing is more infuriating than to have the paper climb off the sprockets, and a paper jam develop. This can be serious, because the paper is being fed at fairly high speed through the printer, and if it all starts to build up inside the machine, the

potential for damage is high. You must be sure that the weight of paper which you wish to use, and in particular the number of sheets you require, can be accommodated.

The characteristics of dot matrix printers must be studied carefully if you are to get what you want out of them. It helps if you understand a little of how they work. Essentially, this is simple, though the electronic and mechanical way in which the functions are achieved represent the highest design skill. Printing is achieved by impact, *ie* the ink on the ribbon is transferred to the paper by means of needles or wires, which are propelled forward by electromagnetic force. The ribbon is in a large cartridge, which is usually re-usable. It is continuous, and therefore does not run out, but merely becomes fainter with use.

There is at least one dot matrix printer, which comes with a carbon ribbon as standard. This is excellent for a while, but as soon as it starts on its second trip through the machine, it produces appalling quality print, so users will always need a good supply of spare ribbons.

Characters are not printed by a single blow, as with a typewriter, instead they are built up by a series of blows from a vertical row of wires. The numbers of wires varies, conventionally 7 or 9 wires, but some more expensive machines offer 18 wires. The software controls which wires are activated at any one time, and the character is made up of a number of impressions, usually 8. Because of the way the characters are produced, sophisticated software can offer more than one character set. It is common now for you to be able to print characters 10 to the inch, 12 to the inch and 16.5 to the inch. Double-width characters, though the same height as normal, are also often available.

Frequently the character sets are different for the various pitches just mentioned, and of course this is essential when the 16.5 characters to the inch version is being used. Twelve characters to the inch is known as *elite* and is very suitable for correspondence.

In the fierce fight for a share in the printer market, the producers vie with one another to see who can provide the most facilities. You must decide which of the new facilities are really of interest to you in your plans for your machine. Some of the facilities are gimmicks which you use briefly, and never use again — like the electrically-operated door mirrors on some cars.

If only one driver uses the car, the setting of the mirrors will be done once, and only varied occasionally for parking perhaps. If the car is used by more than one driver, of different stature, the mirrors will be adjusted with every change of driver, and the apparent gimmick becomes a really worthwhile accessory. It's the same with printer settings.

Only you can decide on the desirability of some of the more specialised facilities: do you really need to be able to design 255 new characters for your own special use? If the printer offers this will you bother to take the time to actually do the work? Do you want to use italics in your printer? If so, is the italic character set sufficiently attractive to make this a worthwhile option?

Will you be using your printer for correspondence? If so, will you want to be able to choose between Double strike (which prints twice on the same spot) or Enhanced (which typically moves the print head part of a dot, so that the second impression is slightly offset from the first), giving something approaching the quality of print associated with Daisywheel printers?

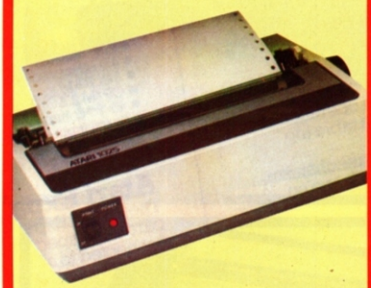
If you are going to use your printer for important letters, do you need a printer which offers proportional spacing (where the printer varies the gaps between letters according to the width of neighbouring letter)? Do you really need a whole variety of Bit image graphics so that your printer can print out pictures of whatever is on your screen in high-resolution graphics? Do you need to be able to print underlines?

The noise level of the printer is also important. Acoustic hoods which suppress the noise of the

A number of popular dot matrix printers — from top, looking left to right: the Epson RX-80, the Epson FX-80, the Mannesmann Tally Spirit-80 and the Walters WM80.

The RX-80 and FX-80 are replacements for the popular MX series of Epson printers.

The Mannesmann Tally and Walters printers both sell for less than £300 and offer true descenders, graphics modes, as well as condensed and enlarged print.



Some computer manufacturers produce 'own brand' dot-matrix printers for use with their machines. Among these are Atari (see left photo) and Commodore (see right photo).

There are a number of factors you'll want to take into consideration when buying a printer, and they all relate to what you want to do with the printer and how much you want to spend.

- If you want to use the printer to fill out preprinted forms, ask whether it handles vertical tabulations, upwards and downwards, or at a minimum, upwards line feeds.
- The variety of paper-handling facilities is often important. Some printers handle continuous stationery, single sheets and paper rolls as standard. With others the dealing is selected on purchase, and to add versatility afterwards is often expensive.
- If you consider a cheap printer, examine samples of the printout. This is always important, but at the lower-priced end of the market you are in danger of buying a machine where the descenders, (the bottom of the letters which go below the line) do not dip below the line, because the head does not have enough wires to do it. Such print is tiring to read.
- Look carefully at the question of interfacing with your computer. Be absolutely certain, or you will find yourself paying almost as much for a suitable interface as you paid for the printer.

printer exist, but as these cost as much as the average dot matrix printer, you may prefer a printer which is not too noisy in the first place. Some printers can be switched in software to operate at less than their normal speed, to give a degree of noise reduction, though the reduction is far from proportional to the reduction in speed.

Multi-speed printers are an interesting possibility. It is possible to buy a machine which will print flat out at 400 characters per second in draft mode, using only a few of its wires (typically 18), and to slow it down progressively to the point where it is going at a mere fraction of that speed, but using all its tricks to leave the uninitiated, or the incurious, oblivious that a dot matrix printer has been used.

This is the Rolls Royce of dot matrix printers, but you will be well advised to think long and hard about its price, which can be well over £2000, whereas a typical 80-column dot matrix printer costs only £300 to £500.

You need to consider the size of paper which the printer is to use. The standard printer prints 80 characters across the 8in width of normal listing paper. The use of the closer pitches already talked about will increase this typically to the maximum of 132 characters. This may well be enough. However, you may want to print out your material on the wider paper over 13 inches wide — in which case your printer choice will be limited to those which accommodate this. If you do a lot of work on schedules, perhaps using spreadsheets, this could be particularly important.

Ease of operation of the printer is always a factor to consider. This includes the insertion and removal of paper, the setting of the dip switches which control the various modes of operation, and the control codes necessary for changes in mode of operation from software.

Micropaedia Editor: Geof Wheelwright
Design: Nigel Wingrove
Contributor: Barry Miles
Illustrations: John Hallett
Cover photo: Monica Curtain
Model: Becky Swift

NEXT WEEK

We continue our examination of printers and printing technology with a look at daisywheel printers, using printers for word processing and the kinds of peripherals you can get for your printer.

And in two weeks, we'll look at ink-jet and colour printers as well as take a peek at plotters.

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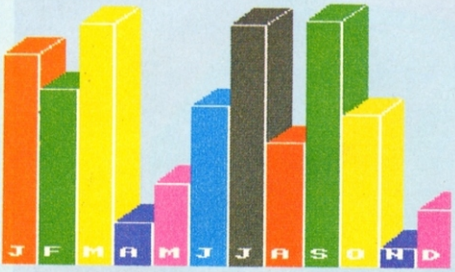

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Follow that code

Machine Code Trace offers much more than its name implies. Simon Williams is enthusiastic.

When developing a machine code program, it can be useful to be able to insert breakpoints in the code or to single step through the opcodes. It would be an added bonus to be able to view the program under development at the same time as keeping an eye on the status of various registers and the stack. Machine Code Trace offers these facilities and more.

Features

The program can maintain two screens where one shows the current status of the user's program, including any graphic screens, and the other displays details normally provided by a good machine code monitor. Functions to view, alter, disassemble and single-step through machine code routines are also available.

Presentation

The program is on cassette, with a 20 page manual, which includes all loading instructions. The manual is produced on a daisywheel printer and is clear and concise both in presentation and content. It includes the listing of a short machine code program used to demonstrate the various features of Machine Code Trace.

In use

Machine Code Trace is preceded by an Initialisation program which sets up the machine to load the main routine. You can specify the run address of the code and the manual has suggestions for optimum positioning of the code when employing the various screen modes of the BBC. The program is 2.75K long and uses &D00 to &D9E as workspace and a 1K area of memory below the current screen to house the Trace screen.

The main display offered on the Trace screen shows the contents of the 6502 registers, the positions of any breakpoint set and a 16-byte window on the processor's stack. The current position of the stack pointer is highlighted in colour. The user prompt throughout the program is a query, displayed near the bottom of the screen. All commands within the program follow the same format and use a single letter followed by one or two addresses in hex. Entry is very user-friendly considering the brevity required of a monitor. The program inserts necessary spaces between commands and addresses and the '&' prefix may be omitted throughout.

The command 'L addr' invokes a single line disassembler which gives the current address, opcode, any branch address (highlighted in colour), assembler mnemonic and any ASCII character that can be obtained from the code. These characters are colour coded to show control codes and the setting of bit 7 within the byte. Pressing the space bar disassembles the next opcode and a window of three lines is maintained at the bottom of the screen.

'T addr' traces through the program from the start address given, disassembling each instruction on the Trace screen, at the same time as executing it on the user screen. Pressing TAB will toggle between the two screens.

'D addr' displays a memory location and its contents. The locations may be selected from anywhere in memory and need not run consecutively. When running Trace, these locations will be continuously updated. This facility is very powerful and a lot more flexible than many other monitors.

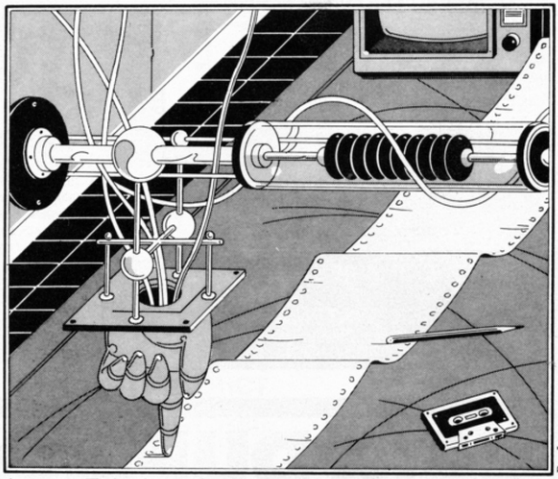
'M addr data' fills the location defined by addr with the user's data. If this address is already displayed on screen, it is immediately updated.

'W reg data' will write given data to any of the 6502 registers.

'B addr' will insert a breakpoint at a given address. This is displayed on the Trace screen as a reminder. It's a shame only one breakpoint may be set at once.

'R' will run the user program immediately from the current address. Its main use is to avoid having to single step through a long routine using the space bar. The escape key will halt a run at any time. When not running the user program, the escape key is disabled. The cursor keys move the window up and down through the stack and CTRL E will exit to Basic.

The manual warns you once or twice of possible error displays or corrupted screens. This is a bit untidy when otherwise the program seems very robust. Although techniques are offered to re-establish the status quo, it is a pity Trace couldn't have taken care of it on its own.



Roy Ingram

Also on the same tape is a simple disassembler. This gives the same display as the three line version included in Trace, but displays ten lines of mnemonics at once. Facilities are provided to print the disassembled listing.

Verdict

The name Machine Code Trace is a misnomer here. It does much more than many full machine code monitors and offers the dual-screen facility, which is invaluable for debugging. The whole program has the feel of being well worked out and designed by someone who fully intended it to simplify their own programming.

RATING

Features	■■■■■
Documentation	■■■■■
Performance	■■■■■
Usability	■■■■■
Reliability	■■■■■
Value for Money	■■■■■

Name Machine Code Trace **System** BBC B **Price** £14.95 **Publisher** Quasar Software, Mughall, Liverpool **Format** Cassette **Language** Machine code **Outlets** Mail order and dealers.

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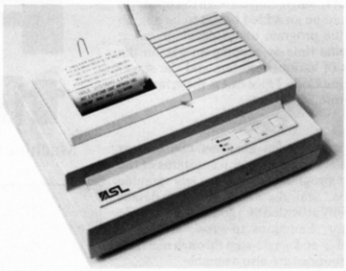

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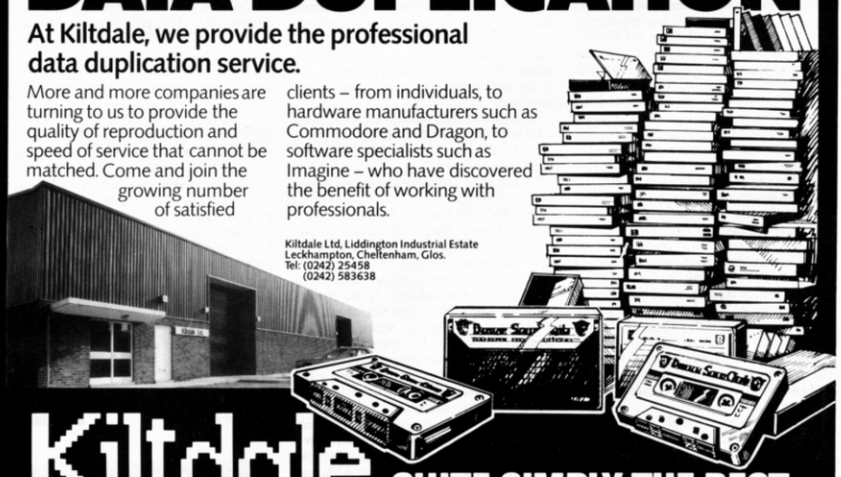

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PCN PRO-TEST SOFTWARE

Over the counter

Was Steve McClure healthier, wealthier and wiser after reviewing these two Atari packages?

To make life easier for the socially active micro user, Atari has come up with Timewise, which it claims will help busy people organise their lives.

Features

Timewise is essentially a glorified version of the conventional desk diary. Unlike desk diaries, however, it enables you to store and access information in a variety of ways.

The program's main menu shows the five parts of the program available to you: one which allows you to review appointments already entered, one which displays (in a calendar format) appointments for any given month between now and 1999, one which lets you browse through your listings while updating appointments, and another to enter the appointments date you want to record. Another selection from the menu is devoted to file maintenance.

The menu is carefully and attractively laid out in the Atari tradition. This is complemented by the equally well-designed instruction brochure.

This program's main selling point is that information can be accessed in a number of different ways. You can look up a particular engagement according to who you are supposed to be meeting, or in terms of what time a meeting is planned for, or in terms of the type of event scheduled: academic, business, personal or whatever.

In use

For example, if you wanted to find out how many birthdays you'd listed under January 1985, enter a *B* for birthdays, under the heading *Type*. You then enter the appropriate data describing January 1985 along with asterisks under *Time* and *Person* (since you're looking for all birthdays in a given month). Timewise then dutifully shows on screen how many birthdays you've seen fit to note in advance.

But where this program, which is designed for machines with at least 32K capacity, falls down is in terms of the quality of stored data. Events entered into Timewise can only be labelled in vague and general terms. This is particularly evident in the category called *Type* which describes what sort of event you've noted. Timewise only allows space for one letter under this heading, so an evening class becomes *C* for *Class*, while a business engagement becomes *B* for *Business*, and so on.

The instruction booklet contains a list of all the various single character symbols which can be used for this function, and you are encouraged to make a notation as to what type of engagement each symbol represents.

TERRY KENNETT

Verdict

It is hard to understand why Atari didn't give capacity to store more letters under the *Type* heading — a minor irritant, to be sure, but one which detracts from the appeal of this program. And it's also strange that you have to use a piece of paper to store information that could just as easily be stored by the program.

Similarly, under *Comments*, only a very small space is allowed for any details about the recorded appointments.

One nice feature of this program is the way in which you can make a special note of an appointment by placing an exclamation mark next to the entry. When it comes on screen a beep sounds, thus making you aware of the engagment's important nature.

Apart from features like this, Timewise is a dependable if somewhat uninspired program.

Name Timewise **Price** £22.99 **Application** Computerised time scheduler **System** Atari (32K, disk) **Publisher** Atari **Format** Disk **Language** Basic **Outlets** Retail

RATINGS (/5)

Features	★★★
Documentation	★★★★★
Useability	★★★
Reliability	★★★★
Overall value	★★★

Shopping List is a program designed for people who are tired of going to the supermarket with their pockets full of pieces of paper on which are inscribed the names of various items needed for the household.

Rather than scramble madly at the shops and try to remember what is needed for the coming week, with this program (so its makers claim) shoppers need only consult a handy, neat printout which tells them exactly what has to be bought.

Included on the printout are details such as the quantity of each item to be bought as well as price.

In fact the designer of the program goes further and claims: 'You will recoup the price of this software in one or two trips through avoiding unnecessary purchases.' That's quite a claim. Let's see if the Atari Shopping List, written by D J Lees of Loudsoft measures up to it.

Features

To begin with, the program lists 18 commodity groups such as *Bread and Cakes, Cooked Meat* and *Clothes*. Each of these groups contains 18 items consisting of commonly-purchased household items. The names of various goods have already been entered into the program, which enables us to learn something of Mr/Ms Lees' tastes, if nothing else.

The program's instruction booklet explains that the commodities listed in 'Atari Shopping List' are oriented towards a large supermarket and that the prices listed are current for March 1983. So you'll probably have to do a little price revision (upwards, one would imagine) if you were to invest in this piece of software.

In use

Using this progam is simple enough. All you do is move through the various lists, entering beside the name of each commodity how many of that particular one you wish to buy. You press 'return' after the last item listed and wait for a printout listing all your purchases, complete with a grand price total, to appear. For obvious reasons a printer is vital when using this program. One problem with 'Atari Shopping list' is that the names of commodities are listed separately from their corresponding prices.

What this means in practice is that when entering the name of a new commodity or updating its price you have to take its number on the original list of 18 commodities and add 18 to it, to figure which price on the price list below the commodity list corresponds to it.

One slip-up here and you'll go ape thinking you're going to have to pay £32 for a bunch of bananas.

This tends to belie the claim that using the program will enable the user to recoup losses by avoiding unnecessary purchases.

Verdict

With a few improvements this program could be helpful.

Name Atari Shopper **Application** Computerised shopping list **Price** £8.50 **System** Atari (32K, disk, printer) **Publisher** Loudsoft, 1, Loudon Place, Castle Donington, Derby, DE7 2SP **Format** Disk **Other versions** None **Language** Basic **Outlets** Mail order/Some retail

RATINGS (/5)

Features	★★
Documentation	★★★
Performance	★★★★
Usability	★★★
Reliability	★★★
Overall value	★★★

SPECTRUM 48K

Dirty old town

Name Urban Upstart **System** 48K Spectrum **Price** £6.50 **Publisher** Richard Shepard Software, 23-25 Elmshott Lane, Chippenham, Slough, Berks. **Format** Cassette **Language** Basic **Other versions** None **Outlets** Mail Order/Retail

And now for something completely different from Peter Cooke, the author of Invincible Island, who has set his new graphics adventure in the grim industrial town of Scarthorpe.

Objectives

Your only desire is to escape from the town, as well it might be when you consider that among its more attractive boulevards are Muck Alley and Amputation Road. There's a scoring system as a guide to how well you do, with a maximum possible score of 22.

In play

Once the adventure is running it proves to be a treat, as different from conventional games as Mad Martha was when it appeared. The grimy town offers lots of scope for amusing locations not to mention hazards like the football fans with an 'O' level in mugging.

Each location's graphics take up the top third of the screen, while underneath is the description, visible exits, objects, and room for your responses. Movement commands are limited to the four compass directions, with the occasional up and down. You can carry and wear up to nine items, but if you try typing HELP all you learn is you're going to need it.

Beginning in your bedroom the first task is to leave the house, which is not too difficult, so long as you take care not to get arrested for indecent exposure. You can then wander the tasteful streets of Scathorpe looking for clues to a possible escape route. Be on your best behaviour, though, the police here are red-hot, ever-vigilant for loiterers and litterers alike. The first trick you must learn is how to get out of jail, and you also need to know how to get out of hospital where you're flung with equal regularity, courtesy of the football fans or the inclement weather.

Responses to you inputs come quickly, and as usual in this type of game the main delays are in waiting for the graphics for each location to be drawn as you move about.

To be honest, it isn't too difficult to complete the bulk of the adventure, but the last few tasks are ingeniously worked out and kept me coming back for more

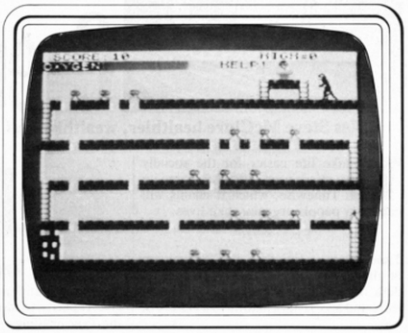
Verdict

There are a lot of laughs in Urban Upstart, plus a fair bit of brain-stretching, and there's no doubt that it's the best thing yet from Richard Shepard Software.

Mike Gerrard

RATING (/5)

Lasting appeal	
Playability	
Use of machine	
Overall value	



Godzilla Kong

Name Godzilla and the Martians **System** 16K Spectrum **Price** £5.95 **Publisher** Temptation Software, 27 Cinque Ports Street, Rye, East Sussex; (0797) 223642 **Format** Cassette **Language** Basic **Other versions** None **Outlets** Mail order/retail.

The Martians have been causing trouble for us Earthlings for years now. Here they are again, this time threatening to destroy the molecular structure of Earth's atmosphere. For some reason they have a Fay Wray stand-in trapped at the top of a building site and Temptation Software obviously believes King Kong has had his day so in a stroke of brilliant originality it has substituted Godzilla.

Objectives

The originality ends here. It's the same old story of rescuing the damsel in distress. You have to get to the top of the building avoiding the Martians and their death traps.

One difference between this and the standard 'Kong' is that you only have a limited time to effect the rescue. The oxygen level is shown at the top of the screen as a horizontal bar and if it runs out it's curtains for you, the lady and the rest of the civilised world as we know it.

In Play

Beneath the extremely attractive and luxurious packaging lies a bundle of surprises, most of them unpleasant.

The building site is a typical snakes and ladders operation with you moving from side to side and ascending the convenient ladders, jumping Martians and death traps en route.

Once at the top, you rescue the damsel as though by magic. However, her death wish reasserts itself and before you know it she's back at the top and you must risk life, limb and terminal boredom once more.

Godzilla is obviously resting on his laurels in this one as the old star of the silver screen lends little more than the weight of his name to the proceedings.

The graphics are slow and jerky which is hardly surprising as the entire program is written in Basic. Sensible use of the cursor keys is made pointless by the poor animation which halts twice a second to accept a key press. This also results in your having little accurate control over your character.

The only good point, and it's purely incidental, is that because the whole thing is in Basic you can examine the listing and perhaps learn something from the exercise.

Verdict

It would be pointless to list all the program's faults, almost as boring as playing the game. The days are long passed when arcade games were acceptable in Basic and you can find better in many magazine listings.

You'd probably get more fun from editing this than from playing it.

Roger Howorth

RATING (/5)

Lasting appeal	
Playability	
Use of machine	
Overall value	

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BEAN
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DRAGON 32

So far as it goes

Name Shuttlezap **System** Dragon 32, joysticks **Price** £12.95 **Publisher** Dragon Data, Kenfig Industrial Estate, Port Talbot **Format** Cassette **Language** Basic/m code **Outlets** Mail order/Retail.

This is essentially Lunar Lander, with the added benefit of some speech.

Dragon's Shuttlezap is a mind-bending game that gives you a space shuttle to fly, your mission to grab as many hostile sputniks as possible, then return to safety on earth.

In play

Another talking game, but there isn't really a lot to it. After an optional instruction session, you have a chance to master the joystick controls (a nice touch) before zooming off into space. The only remaining task is to specify your fuel and time limits.

Before take-off a countdown is given, but I found you didn't need to manoeuvre out of your silo base — you could fly straight through the walls. Your remaining fuel and time are displayed on screen throughout. Infuriatingly, there's no wraparound at the screen edge.

Objectives

Whenever you rejoin the screen, you always re-appear on the left and the sputniks always on the right. The shuttle will only fly left to right and the reverse thrust isn't sufficient to carry you backwards for any length of time. The result was that during my first attempts I'd end up more off the screen than on it.

The graphics were good but the game didn't really deserve them. Sputniks had to be approached cautiously as they were armed with a laser, but this could only fire horizontally. After some practice it was fairly easy to sneak up on (or under) them.

Returning to base was far trickier than leaving. By the time you returned from your mission — whether or not you'd bagged any satellites — a cosmic death cloud had enveloped the earth. The radar base station sends out a magic beam which clears a safe path for you. A fair amount of fuel is needed to keep airborne during this. Bringing the shuttle down proved to be the most difficult of all, and I found the joystick controls weren't as good as I thought they should be.

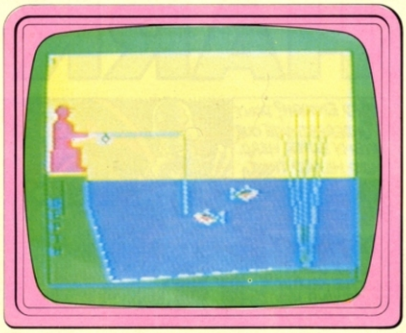
Verdict

The speech from the program was a considerable disappointment. The meanings for some of the commands could only have been guessed at. At the end of a high score game came "Burst sofa". After the laughter had died away, it was clear (because it was printed on the screen) it was saying 'Best so far.' Something you couldn't say about this high priced game.

Jim Ballard

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	



Hook and eye

Name Hooked! **System** Dragon 32 **Price** £5.75 **Publisher** Shards, 189 Eton Road, Ilford, Essex **Format** Cassette **Language** Basic **Other Versions** None **Outlets** Mail order, Boots

Is no hobby safe from the avid games programmer? Angling is the latest attempt to glue you to your monitor, a rather more sedate activity than the usual sources of inspiration, like aquaplaning and pot-holing, so what next? A game based on philately or aimed at students of gothic architecture?

Objectives

You must land as many fat fish as you can in whatever time limit you choose, and you can have one- or two-player games.

In play

In fact, a variety of options are open to you, all put to you at the start. There are four skill levels; you can have the fish still or moving, you can use keyboard or joystick, and have any time limit up to 15 minutes. After choosing, the picture forms in PMODE 3 showing an angler seated by a river-bank with rod and line stretched out over the water. Under the surface are a couple of fish, each with yellow biting zones round their heads.

Using joystick or arrow keys you first try to set the length of the rod so that it is directly above your fishy target, then set the depth of the cast according to a scale that appears beneath the angler. Pressing the fire-button or 'C' key makes the cast, which has to land right within the yellow zone to be successful. You have three attempts before the fish move to different positions, while if you cast your line into the river-bed you have three chances to recover it, before the line breaks.

If you get a fish on the line the angler stands up, a landing net appears in the water, and you must manoeuvre the fish safely into the net without getting too close to the frame, or the line breaks and the fish swims merrily off avoiding that rendezvous with a plate of chips. Each time you land a fish you're told the type and weight of your catch, and a running total is kept as long as you're in time or want to keep playing.

A sloppy piece of programming asks after every catch if you want to fish again. If you type 'Yes' then you can't alter the skill level or other conditions, while if you type 'No' the program ends and have to re-RUN.

The graphics are what you'd expect from the Dragon using simple Basic, while the sound is limited to a few beeps. Nevertheless the game requires a fine eye, particularly on the hardest level where you're aiming at what appears to be a single pixel on the screen. Overall, the game soon became boring. It might appeal more to the very young, or perhaps suit a family challenge.

Verdict

I wasn't hooked, and I can't see this finding a plaice in many software collections.

Mike Gerrard

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	

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PCN PROGRAMS ORIC-1 48K

MINESCAPE

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Title: ***Minescape***
Machine: ***Oric-1 48K***
Application: ***Game***
Language: ***Oric Basic***
Author: ***L J Lynch***

Minescape, from L J Lynch of Runcorn in Cheshire, is a game of skill, strategy, nerve and speed. The idea is to first of all cross a minefield and then wend your way through a series of mined mazes. You gain points as you move forward and when you complete a section. You lose points if you move backwards, so much so that if you backtrack too far then BANG, you are out of the game due to your negative score.

To help you on your way you have a slightly defective mine detector. This only clicks if there are mines in adjacent squares — it does not give any hint as to which square, this momentous decision is left up to you. In addition to the detector there is a meagre stock of hand grenades. These can be used to either blow up mines or remove parts of the maze.

One useful feature of the game is the ability to press the 'P' key to pause the game. This enables you to stop the game to answer the telephone, or even gain some thinking time since the clock tends to run out fairly quickly.

At the end of the game sit back and listen to the score music; good, eh?

PROGRAM NOTES

0-15	Reads DATA and prints the instructions using the subroutine at 8000. The game starts at line 200:
19-30	This subroutine is used when you lose a life. It makes the EXPLODE sound and blots you off the screen.
35-55	Subroutine for the mine detector. Calling #FB03 causes a click.
60-95	Subroutines for throwing grenades. These are called from lines 860-930.
200-220	Turn off the cursor and key click, then set the screen colours.

```
5 CLS:GOSUB20000:GOSUB40000:PAPER1
7 PRINT:PRINT:PRINT" DO YOU WANT INSTRUC
TIONS (Y/N)?"
9 GET A$
11 IF A$="N"THENGOTO 200
13 IF A$="Y"THENGOSUB 8000 ELSE GOTO 9
15 GOTO200
19 REM ** SUBROUTINE FOR LOSING A LIFE
20 EXPLODE:L$=MID$(L$,2):PLOT18,26,L$
25 CH=117:FORJ=1TO10:PLOTA,B,CH:CH=CH+1:
NEXTJ:A=15:B=24:WAIT50
30 RETURN
33 REM *** SUBROUTINE FOR MINE
 DETECTOR CLICKS ***
35 IFSCRN(A-1,B)=98THENCALL#FB03
40 IFSCRN(A+1,B)=98THENCALL#FB03
45 IFSCRN(A,B-1)=98THENCALL#FB03
50 IFSCRN(A,B+1)=98THENCALL#FB03
55 RETURN
57 REM *** SUBROUTINES FOR THROWING
 GRENADES ***
60 SHOOT:GR=GR-1:IFSCRN(A+2,B)=98THENWAI
T20:EXPLODE:S=S+25
65 !9,25;GR;:CH=117:FORJ=1TO10:PLOTA+2,B
,CH:CH=CH+1:NEXTJ:WAIT50:RETURN
70 SHOOT:GR=GR-1:IFSCRN(A-2,B)=98THENWAI
T20:EXPLODE:S=S+25
75 !9,25;GR;:CH=117:FORJ=1TO10:PLOTA-2,B
,CH:CH=CH+1:NEXTJ:WAIT50:RETURN
80 SHOOT:GR=GR-1:IFSCRN(A,B+2)=98THENWAI
T20:EXPLODE:S=S+25
85 !9,25;GR;:CH=117:FORJ=1TO10:PLOTA,B+2
,CH:CH=CH+1:NEXTJ:WAIT50:RETURN
90 SHOOT:GR=GR-1:IFSCRN(A,B-2)=98THENWAI
T20:EXPLODE:S=S+25
95 !9,25;GR;:CH=117:FORJ=1TO10:PLOTA,B-2
,CH:CH=CH+1:NEXTJ:WAIT50:RETURN
190 REM *** TURN OFF CURSOR & KEYCLICK
200 PRINTCHR$(17);CHR$(6)
220 CLS:PAPER2
```

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Ian Hickman

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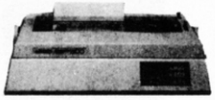

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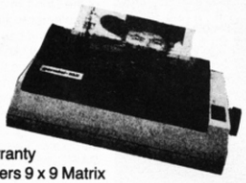

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MINESCAPE

230	Turn off the keyboard.
240-260	Draw the screen border.
280-300	Set up the variables for lives, paper colour and score.
310	This is equivalent to randomise since location 630 is fairly unpredictable.
340-480	Print the titles onto the screen.
500-600	Set up the mines on the screen.
620	Initialise the coordinates of the man (A,B).
640	Re-enable the keyboard and PING you're ready to go.
660	Begin the main loop.
680	Put the score onto the screen.
700	Put man onto screen and gosub to do detector clicks.
720-840	Get the move and update the man position, adjust the score if a step back, also check for walls.
860-930	Check for a grenade throw and gosub to the appropriate routine for the direction of the throw.
940-950	Check for going off the screen.
960	Decrement the time and put it onto the screen.
970-980	Check the time. If you are out of time then BANG you are dead.

```
225 REM *** DISABLE KEYBOARD INTERRUPTS
(SPEEDS BASIC BY 20%) ***
230 CALL#E6CA
235 REM *** BUILDS SCREEN BOARDER ***
237 REM *** PLOT X,Y,128 PLOTS A BLOCK
  OF INVERSE COLOUR AT X,Y ***
240 FORX=2TO35:PLOTX,24,128:PLOTX,3,128:
NEXTX
260 FORY=3TO24:PLOT1,Y,128:PLOT36,Y,128:
NEXTY
270 REM *** INITIALISE ***
280 L$="fff "
300 L=3:P=2:S=0
308 REM *** NEXT LINE = RANDOMIZE ***
310 D=RND(-DEEK(630))
320 D=INT(RND(1)*30)+90
340 PLOT25,1,"MINES:":PLOT1,1,"SCORE:"
360 GR=4
380 PLOT1,25,"GRENADES:":!9,25;GR;
390 PLOT22,25,"HI-SCORE:":!30,25;HS;
400 X=8:FORJ=1TO3:PLOTX,3,32:X=X+11:NEXT
J
420 PLOT12,26,"LIVES:":PLOT18,26,L$
440 !31,1;D;
460 T=350
480 PLOT13,0,"TIME:":!18,0;T;
500 FORJ=1TOD
520 X=INT(RND(1)*35)+1
540 Y=INT(RND(1)*20)+3
560 IFSCRN(X,Y)=98ORSCRN(X,Y)=128THENGOT
O520
580 PLOTX,Y,98
600 NEXTJ
620 A=15:B=24:PLOTA,B-1,32
630 REM *** RE-ENABLE KEYBOARD INTERRUPT
S ***
640 CALL#E804:PING
650 REM *** MAIN LOOP ***
660 REPEAT
680 !7,1;S;
700 PLOTA,B,102:GOSUB35
720 K$=KEY$
740 IFK$=CHR$(8)THENPLOTA,B,107:A=A-1:IF
SCRN(A,B)=128THENA=A+1
760 IFK$=CHR$(9)THENPLOTA,B,107:A=A+1:IF
SCRN(A,B)=128THENA=A-1
780 IFK$=CHR$(10)THENPLOTA,B,109:B=B+1:S
=S-20
800 IFSCRN(A,B)=128THENB=B-1:S=S+20
820 IFK$=CHR$(11)THENPLOTA,B,109:B=B-1:S
=S+10
840 IFSCRN(A,B)=128THENB=B+1:S=S-10
860 IFK$="Q"ANDGR>0THENPLOTA,B,95:WAIT50
:GOSUB90
880 IFK$="2"ANDGR>0THENPLOTA,B,95:WAIT50
:GOSUB60
900 IFK$="1"ANDGR>0THENPLOTA,B,95:WAIT50
:GOSUB70
920 IFK$="A"ANDGR>0THENPLOTA,B,95:WAIT50
:GOSUB80
930 IFK$="P"THENPLOT14,2,12:PLOT15,2,"PA
USE":GOSUB7000
940 IFB>24THENB=24
945 IFA<2THENA=2
950 IFA>35THENA=35
960 T=T-1:!18,0;T;
970 IFT=50THENPLOT12,0,12
980 IFT=<0THENL=L-1:GOSUB20:T=200:PLOT12
```

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MINESCAPE

1000	You have stood on a mine, oh dear!
1020	If there are no lives left jump to 3000.
1040	Game continues until the top of the screen is reached.
1060-1120	Change the paper colour each time a new level is reached.
3000-3540	Routine for Hi-Lo score, gives options of playing again and plays the appropriate tune, if selected.
5000-6100	Plots random maze. Keyboard is disabled to get up a bit of speed.

```
,0,8:GR=4:!9,25:GR:WAIT150
1000 IFSCRN(A,B)=98THENL=L-1:GOSUB20:GR=
4:!9,25:GR:
1020 IFL=0THENWAIT200:GOTO3000
1040 UNTILB=3
1050 REM *** CHANGE PAPER COLOUR ***
1060 P=P+1:IFP=7THENP=1
1070 IFP=4THENP=5
1110 S=S+50
1120 GOTO5000
3000 CLS
3010 IFS>HSTHENHS=S:GOTO3500
3020 PRINTCHR$(4)
3030 PRINT:PRINT:PRINTSPC(6);CHR$(27);"J
HIGH SCORE IS: "HS
3040 PRINT:PRINT
3050 PRINT:PRINTSPC(4);CHR$(27);"JYOU SC
ORED: "S" POINTS!":PRINTCHR$(4)
3055 GOSUB15000
3060 PLOT6,23,"(FOR INSTRUCTIONS PRESS '
I')"
3070 PLOT8,25,"ANOTHER GO (Y/N)"
3080 GETA$
3090 IF A$="N"THENPAPER7:PRINTCHR$(6);CH
R$(17):CLS:END
3100 IF A$="Y"THENGOTO220
3110 IF A$="I"THENGOSUB8000
3120 GOTO3070
3500 PRINTCHR$(4)
3510 PRINT:PRINT:PRINTSPC(8);CHR$(27);"N
A NEW HIGH SCORE !!!"
3520 PRINT:PRINT
3530 PRINT:PRINTSPC(11);CHR$(27);"J";S;"
 POINTS":PRINTCHR$(4)
3535 WAIT20:GOSUB14000
3540 GOTO 3060
4999 REM **** BUILD MAZE ****
5000 CLS:PAPER P:CALL#E6CA 'REM ** DISAB
LE KEYBOARD INTERRUPTS **
5050 FORX=2TO36
5100 PLOTX,3,128:PLOTX,23,128
5150 NEXTX
5200 FORY=3TO23
5250 PLOT1,Y,128:PLOT36,Y,128
5300 NEXTY
5350 FORY=3TO23STEP2
5400 FORX=1TO35
5450 PLOTX,Y,128
5500 NEXTX,Y
5550 FORJ=1TO60
5600 X=INT(RND(1)*35)+1
5650 Y=INT(RND(1)*20)+3
5700 IFSCRN(X,Y)=128THENGOTO5600ELSEPLOT
X,Y,128
5750 NEXTJ
5800 FORJ=1TO120
5850 X=INT(RND(1)*30)+3
5900 Y=INT(RND(1)*18)+4
5950 IFSCRN(X,Y)=32THENGOTO5850ELSEPLOTX
,Y,32
6000 NEXTJ
6050 X=8:FORJ=1TO3:PLOTX,23,32:X=X+11:NE
XTJ
6100 D=INT(RND(1)*40)+40:GOTO340
6990 REM *** SUBROUTINE FOR PAUSE ***
7000 REPEAT
7010 K$=KEY$
7020 UNTILK$="P":PLOT14,2,8:FORJ=15TO19:
```

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TIMESCAPE

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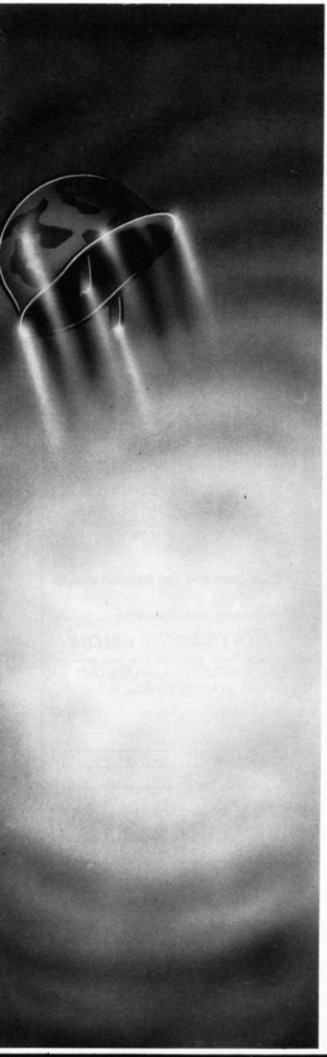
MINESCAPE

7000-7030 Pause subroutine. The P key, if pressed during the game, stops the game to allow you to go and get a cup of coffee (or tiffin).

8000-8580 Instructions.



```
PLOTJ,2,32:NEXTJ
7030 RETURN
7990 REM *** INSTRUCTIONS ***
8000 CLS
8010 PRINTSPC(15)"ESCAPE"
8020 PRINT:
8030 PRINT"THE OBJECT OF THE GAME IS TO
GET YOUR MAN ACROSS THE MINEFIELD OR";
8040 PRINT" THROUGH    THE MAZE BEFORE 'T
IME' RUNS  OUT. ";
8050 PRINT"AT  THE START OF EACH SCREEN
'TIME' WILL  BE SET TO 350. ";
8060 PRINT"GRENADES ARE SET AT 4."
8070 PRINT"IF 'TIME' REACHES ZERO THEN A
 LIFE IS LOST AND 'TIME' IS RESET ";
8080 PRINT"TO ONLY 200  INSTEAD OF 350."
8090 PRINT"YOUR MEN ARE EACH EQUIPPED WI
TH A MINEDETECTOR AND FOUR ";
8100 PRINT"GRENADES. WHEN IN  THE VICIN
ITY OF A MINE YOU WILL HEAR A";
8110 PRINT"CLICKING SOUND, BUT THE MINE
COULD BE IN ANY ONE OF THREE ";
8120 PRINT"DIRECTIONS."
8125 PRINT"A GRENADE WHEN THROWN WILL LA
ND TWO   PACES AWAY. ";
8130 PRINT"TO HIT ANY PARTICULAR SPOT";
8140 PRINT"YOU MAY NEED TO MOVE YOUR MAN
"
8150 PRINT"YOU MAY ALSO USE GRENADES TO
KNOCK    DOWN A WALL IF YOU ARE ";
8160 PRINT"BLOCKED."
8170 PRINT"THE GAME STARTS WITH A MINEFI
ELD AND PROGRESSES TO AN INFINITY ";
8180 PRINT"OF MAZES."
8185 PRINT" NB EACH MAN HAS 4 GRENADES P
ER SCREEN"
8190 PRINT"   PRESS ANY KEY TO CONTINUE"
8200 GETA$
8210 CLS
8220 PRINT:PRINTSPC(8)"SCORING IS AS FOL
LOWS"
8230 PRINT:
8240 PRINT"EACH STEP FORWARD ----- 10 PO
INTS"
8250 PRINT:
8260 PRINT"EACH STEP BACK --";CHR$(27);"
LMINUS";CHR$(27);"H20 POINTS"
8270 PRINT:
8280 PRINT"HIT MINE WITH GRENADE - 25 PO
INTS"
8290 PRINT:
8300 PRINT"SURVIVING EACH SCREEN - 50 PO
INTS"
8310 PRINT:PRINT" PRESS ANY KEY TO CONTI
NUE"
8320 GETA$
8330 CLS
8340 PRINT:
8350 PRINTSPC(6)"CONTROL KEYS ARE AS FOL
LOWS"
8360 PRINT:
8370 PRINT"TO MOVE YOUR MAN USE THE RELE
VANT     CURSOR (ARROW) KEY"
8380 PRINT:
8390 PRINT"TO THROW A GRENADE USE THE FO
LLOWING"
8400 PRINT:
```

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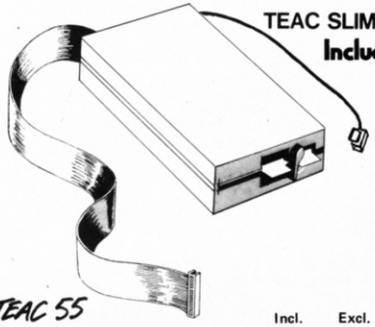

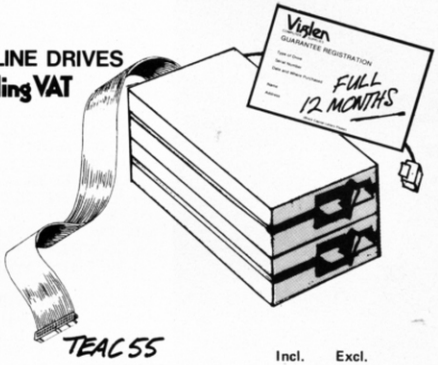

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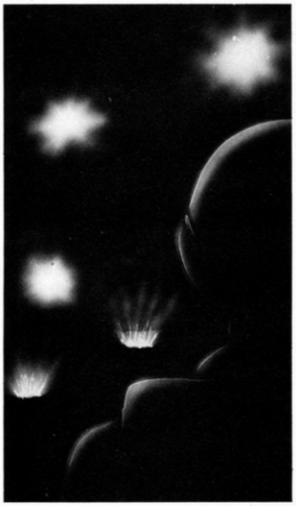

```
8410 PRINT"TO THROW RIGHT USE KEY -------
 '2'"
8420 PRINT:
8430 PRINT"TO THROW LEFT USE KEY --------
 '1'"
8440 PRINT:
8450 PRINT"TO THROW FORWARD USE KEY -----
 'Q'"
8460 PRINT:
8470 PRINT"TO THROW BACKWARD USE KEY ----
 'A'"
8480 PRINT:PRINT:
8490 PRINT"     TO HALT THE GAME FOR ANY
REASON"
8500 PRINT:PRINT"USE KEY ---- 'P' (Pause
 / Restart)"
8510 PRINT:PRINT" PRESS ANY KEY TO CONTI
NUE"
8520 GETA$
8530 CLS
8540 PRINT:PRINT:PRINT"PRESS 'M' IF YOU
WISH HI/LOW SCORE"
8545 PRINT"MUSIC TO BE PLAYED"
8550 PRINT:PRINT:PRINT"ANY OTHER KEY WIL
L TURN MUSIC OFF"
8560 GETA$
8570 IFA$="M"THENZZ=0:CLS:RETURN
8580 ZZ=-1:CLS:RETURN
13990 REM *** SUBROUTINE FOR HI-SCORE
```

PCN PROGRAMS ORIC-1 48K

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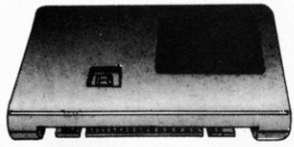

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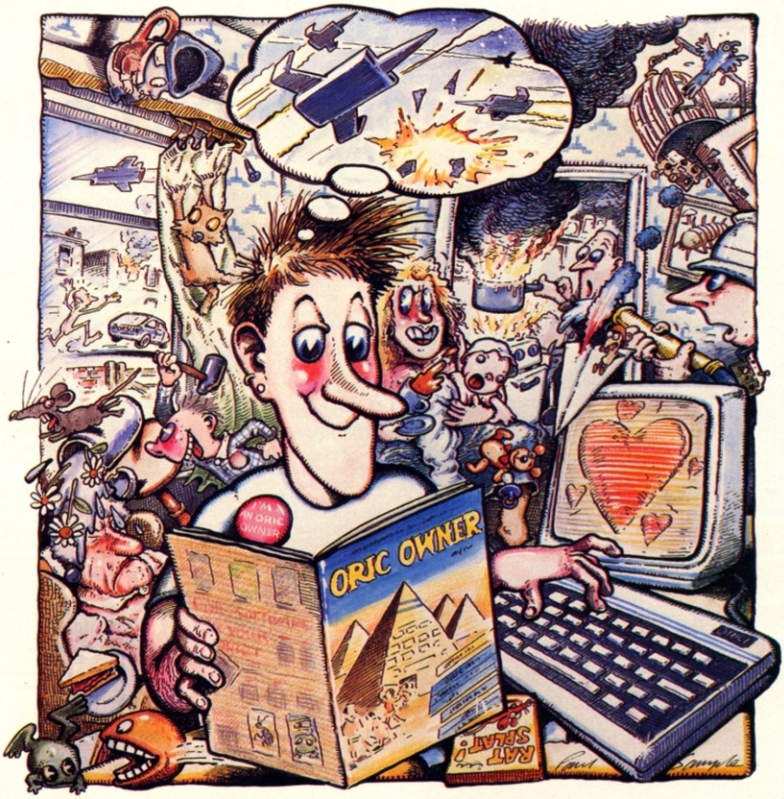
14000-14240	High score music.
15000-15170	Low score music.
20000-20090	Redefines the characters.
40000-40070	Redefines ! to mean print at. Note that this routine is borrowed from the users manual.

```
     MUSIC ***
14000 IFZZ=-1THENRETURN
14005 Z=0
14010 A$="37:78573:8753"
14020 B$="59<9:795<:975"
14030 C$=A$
14040 FORY=1TO3
14050 FORJ=1TOLEN(A$)
14060 X=ASC(MID$(A$,J,1))-48
14070 MUSIC1,3,X,6
14080 MUSIC2,7,X,9
14090 PLAY7,0,0,0
14100 WAIT10
14110 MUSIC1,4,X,5
14120 MUSIC2,6,X,9
14130 MUSIC3,3,X,9
14140 PLAY7,0,0,0
14150 WAIT12
14160 NEXTJ
14170 WAIT25
14180 IFZ=-1THENA$=C$:GOTO14210
14190 Z=-1:A$=B$
14210 NEXTY
14220 WAIT10
14230 PLAY0,0,0,0
14240 RETURN
14990 REM *** LOW SCORE MUSIC ***
15000 IFZZ=-1THENRETURN
15010 A$="68:8::5685686:8356"
15020 B$="1565861351151651111"
15030 FORJ=1TOLEN(A$)
15040 IFJ=6THENWAIT50
15050 IFJ=10THENWAIT80
15060 IFJ=15THENWAIT50
15070 X=ASC(MID$(A$,J,1))-48
15080 Y=ASC(MID$(B$,J,1))-48
15090 PLAY7,0,0,0
15100 MUSIC1,3,Y,9
15110 MUSIC2,3,X,10
15120 MUSIC3,4,X,11
15130 WAIT20
15140 NEXT
15150 WAIT90
15160 PLAY0,0,0,0
15170 RETURN
19990 REM *** RE-DEFINE CHARACTERS ***
20000 FORA=1TO5:READ B
20010 FORJ=0TO7:READ D
20020 POKE46080+J+(8*B),D
20030 NEXTJ,A
20040 DATA98,0,0,0,0,0,0,0,0
20050 DATA102,12,12,30,45,12,30,18,18
20060 DATA107,0,0,0,0,6,0,0,24
20070 DATA109,0,0,2,2,16,16,0,0
20080 DATA95,0,0,0,1,1,14,10,58
20090 RETURN
39990 REM *** RE-DEFINE '!' TO MEAN
     PRINT AT (PRINT @) ***
40000 REPEAT
40010 READD
40020 POKE#400+C,D
40030 C=C+1:UNTILD=#FF
40040 DATA#20,#96,#D9,#AC,#F8,#02,#C8,#8
C,#69,#02,#A5,#1F,#A4,#20,#85,#12,#84
40050 DATA#13,#A9,#3B,#20,#DB,#CF,#4C,#6
1,#CB,#FF
40060 DOKE#2F5,#400
40070 RETURN
```



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New-Sinclair QL

There's no comparison chart, b

The Sinclair QL is a new computer.

Not just a new Sinclair computer, but a totally new sort of computer – nothing like it exists anywhere.

It's not just a bit better than this, or a bit cheaper than that – it's a computer that's very hard to compare with anything. Just check the features below – and if you don't agree, take up the challenge at the end of the advertisement.

If you do agree, there's only one course of action you can take… get yourself a Sinclair QL at the earliest possible moment.

The Sinclair QL has 128K RAM. Big deal?

Several micros offer 128K RAM, or more, as standard. The 'What Micro?' table for December 1983 lists over 50 of them – but 40 of the 50 micros listed cost over £2,500!

The Sinclair QL offers you 128K RAM for under £400, and an option to expand to 640K. That's a lot of bytes to the pound!

The Sinclair QL has a 32-bit processor. Who else?

Under £2,700, nobody. Even the new generation of business computers, such as the IBM PC, are only now beginning to use 16-bit processors.

At prices like this, the Motorola 68000 family – widely regarded as the most powerful microprocessors available – will remain a luxury.

Yet with the Sinclair QL, the 32-bit Motorola 68008 is available for less than £400.

You can also be sure that the QL will not become outdated. 32-bit architecture is future-proof.

32-bit processor architecture, 128K RAM, and QDOS combine to give the QL the performance of a mini-computer for the price of a micro.

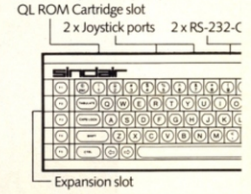
Exclusive: new QDOS operating system

No competition! QDOS sets a new standard in operating systems for the 68000 family of processors, and may well become the industry standard.

QDOS is a single-user, multi-tasking, time-sliced system using Sinclair's new SuperBASIC as a command language.

One of its most significant features is its very powerful multi-tasking capability – the ability to run several programs individually and simultaneously. It can also display the results simultaneously in different portions of the screen. These are features not normally available on computers costing less than £7,000.

Eleven input/output ports



New professional keyboard

The QL keyboard is designed for fast input of data and programs.

It is a full-size QWERTY keyboard, with 65 keys, including a space bar; left-and right-hand shift keys; five function keys; and four separate cursor-control keys – key action is positive and precise

A membrane beneath the keyboard protects the machine from dust (and coffee!), and for users who find an angled keyboard more comfortable, the computer can be raised slightly at the back by small detachable feet.

™ Sinclair, QL, QDOS, QLUB and ZX Microdrive are trade marks of Sinclair Research Ltd.

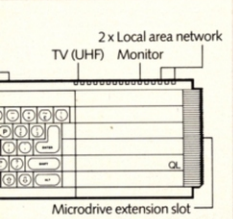
£399

ecause there's no comparison!

Advanced new friendly language – Sinclair SuperBASIC

The new Sinclair SuperBASIC combines the familiarity of BASIC with a number of major developments which allow the QL's full power to be exploited.

Unlike conventional BASIC, its procedure facility allows code to be written in clearly-defined blocks; extendability allows new procedures to be added which will work in exactly the same way as the command procedures built into the ROM; and its constant execution speed means that SuperBASIC does not get slower as programs get larger.



Two 100K microdrives built in

The Microdrives for the Sinclair QL are identical in principle to the popular and proven ZX Microdrives, but give increased capacity (at least 100K bytes each) and a faster data-transfer rate. Typical access speed is 3.5 seconds, and loading is at up to 15K bytes per second. The Sinclair QL has two built-in Microdrives. If required, a further six units can be connected.

Four blank cartridges are supplied with the machine.

Included – superb professional software

The suite of four programs is written by Psion specially for the QL and incorporates many major developments. All programs use full colour, and data is transportable from one to another. (For example, figures can be transferred from spreadsheet to graphics for an instant visual presentation.)

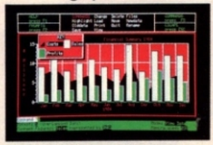
Word-processing

Certain to set a new standard of excellence, QL Quill uses the power of the QL to show on the screen exactly what you key in, and to print out exactly what you see on the screen.

A beginner can be using QL Quill for word-processing within minutes.

QL Quill brings you all the facilities of a very advanced word-processing package.

Business graphics



QL Easel is a high-resolution colour program so easy to use you probably won't refer to the manual! It handles anything from lines, shaded curves or histograms to overlapping or stacked bars or pie charts. QL Easel does not require you to format your display before entering data; it handles design and scaling automatically or under your control. Text can be added and altered as simply as data.

Spreadsheet

QL Abacus makes simultaneous calculations and 'what if' model-construction easier than they've ever been. Sample applications are provided, including budget-planning and cash-flow analysis. QL Abacus allows you to refer to rows, columns and cells by names, not just letters and numbers. Function keys can be assigned to change a variable and carry out a complete 'what if' calculation with a single key-stroke.

Database management

QL Archive is a very powerful filing system which sets new standards, using a language even simpler than BASIC. It combines ease of use for simple applications – such as card indices – with huge power as a multi-file data processor.

An easy-to-use labelling facility means that you don't have to ask for your file by its full name – a few letters are enough.

New – the Sinclair QLUB

The QLUB is the QL Users Bureau. Membership is open to all QL owners. For an annual subscription of £35, QLUB members receive one free update to each of the four programs supplied with the QL, and six bi-monthly newsletters. Sinclair has also made exclusive arrangements for QLUB members to obtain software assistance on QL Quill, Abacus, Archive or Easel by writing to Psion.

The Sinclair QL challenge

If you're seriously considering any other computer, post the coupon for a blow-by-blow comparison. We'll take a *published* comparison chart for the machine you're considering (not one we've created ourselves) and give you the Sinclair QL figures, detail by detail.

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If your association has something special on the agenda or if you've just started a new one, contact us at *Clubnet, Personal Computer News*, VNU, 62 Oxford Street, London W1A 2HG. Clubnet keeps you in touch with enthusiasts throughout the country. It is divided into clubs and user groups and lists of both will be published every four weeks.

Let us know about your micro club or user group so we can be sure the information printed here is up to date. Drop a card to Wendie Pearson, Listings Editor, at *Personal Computer News*, 62 Oxford Street, London W1A 2HG, or give her a call on 01-636 6890.

Talking shop

When Lancaster Computer Club held an open day at Lancaster Town Hall, 1,300 people came in just a few hours to see goods exhibited by local computer shops.

The club's Tuesday meeting venues alternate between a hotel and the Castle Computers Shop, and are attended by 50 or so members, over half of whom are school age.

The shop is owned by club chairman David Smith who supplies new products for examination.

At these programmers' Workshop meetings members also learn machine code, while the meetings at the hotel consist of a talk and trying out various ideas on members' micros.

At the most recent of these an explanation of programming to maintain the Sunday Football League tables was followed by a talk on BeebCalc, which a local theatre company uses.

The club has previously held courses on machine code and Basic at Lancaster University. They have also built aids to help spastics at local Beaumont College learn now to use micros.

'They're very good at it,' said club member Brian Sheldon. 'They've written some fairly long programs using a bar strapped to their forehead to tap the keys.'

'Many of our adult members build their own hardware,' he said, 'and at the moment we're concentrating on explaining machine code to the younger members.'

Wendie Pearson

Name Lancaster Computer Club **Venue** Greeves Hotel, Greeves Road, Lancaster or Castle Computers, Lancaster **Meetings** Every Tuesday, 7.30pm **Contact** Brian Sheldon, 0524 423134.

Acorn

Coventry Acorn Atom User Group. Peter Frost, 18 Frankwell Drive, Coventry, 0203 613156.

Kent Medway Acorn User Group. Meets at St John Fisher School on last Monday of month at 7pm. Sessions at 9pm Thursday at the Fox and Hound, Chatham. Clem Rutter, c/o St John's Fisher School, Ordance Street, Chatham, Kent, 0634 42811 (day), 0634 373459 (evenings).

Manchester Acorn User Group. Meets at AMC, Crescent Road, Crupsall, Manchester 8 on Tuesday except school holidays. John Ashurst, 192 Vendure Close, Failsworth, Manchester, 061-681 4962.

Apple

Ashtead Apple User Group. Meets first Monday of every month. Contact M Lawrence, 15 Petters Road, Ashtead, Surrey.

British Apple Systems User Group, PO Box 174, Watford WD2 6NF.

British Apple Systems User Group. Meets first Tuesday evening and third Sunday afternoon every month at Old School, Branch Road, Park Street, St Albans. Subs: £12.50+£2.50 joining. Contact D Bolton, 0727 72917.

Birmingham & Region Apple Group. Contact Mel Golder, 021-426 2275.

Birmingham Midapple User Group. Contact Merlyn Golder at Pool Farm Boys Club, Hillmeads Road, Kings Norton, Birmingham.

Bristol Apple Users and Dabblers. Meets at 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, once a month. Ewa Dabkowski, c/o Datalink, 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, 0272 213427.

Buckinghamshire Apple User Group. Steve Profitt, The Granary, Hill Farm Road, Marlow Bottom, Buckinghamshire, 062 84 73074.

Chelmsford Apple Users Club. Proposed new club. Contact D Beckingham, 571 Galleywood Road, Chelmsford, tel: Chelmsford 66948.

Croydon Apple User Group. Meets at Sidda House, 350 Lower Addiscombe Road, Croydon, on second Monday of month. Paul Vernon, 60 Flawkhurst Way, West Wickham, Kent, 01-777 5478.

London Apple Music Synthesis Group. Dr Davis Ellis, 22 Lennox Gardens, London SW1.

South-East London Apple User Group (Appletree). Contact John Grieve at 106 Maran Way, Erith, Kent or phone 01-311 7681.

Milton Keynes Microcomputer User Group. Meets every Tuesday, 7.30pm. Brian Pain, Sir Frank Markham School, Woughton Centre, Chaffron Way, Milton Keynes.

Warrington Apple User Group. Meets at Horse & Jockey on first Monday of the month. Contact Jim Roscoe, Warrington 38101.

Nottingham Atari User Group. Meets second and fourth Monday of each month at the Congregational Federation Centre, Castle Gate. Contact Richard Rose on Nottingham 623766.

Atari

Birmingham User Group. Meets at the Malaga Grill, Matador Public House, Bull Ring shopping centre, Birmingham, on second and fourth Thursday every month at 7.30pm. Mike Aston, 42 Short Street, Wednesbury, West Midlands.

Carshalton Atari User Club. Paul Deegan, 01-642 5232.

Lea Valley Atari User Group. Meets every month. Details from Matthew Tydeman, 125 Cadmore Lane, Cheshunt, Herts.

South Cheshire Atari User Group. Meets at the Earl of Crewe, Nantwich Road, Crewe, on first Thursday of each month at 7.30pm. Contact A Davies, 48 Blagg Lane, Nantwich, Cheshire, 0270 626969.

Essex. Contact John Sarrar, 138 Frederick Road, Rainham, Essex, tel (76) 22077. Meets at Rainham Town Football Club, 7.30pm, second and fourth Friday of each month.

London Silica Atari 400/800 User Club. Richard Hawes, 01-301 1111.

Manchester Atari Computer Enthusiasts. Meets at The Ellesmere, Worsley Road, Worsley, on the second and last Thursday of every month. Contact Martin Davies, Bolton 700757.

South Middlesex Atari Club. Meets fortnightly, Tuesdays, at Staines Methodist

80 ►

Church Hall, Kingston Road, Staines. Contact Brian Milligan, 50 Linkscroft Avenue, Middelesex. Tel: Ashford (69) 45387.

Norwich Atari User Group. Ken Ward, Norwich 661149.

Preston Atari Computer Enthusiasts. Meets at KSC Club, Merrion House, Beach Grove, Ashton, Preston, on third Thursday of month at 7.30pm. Roger Taylor, 0253 738192.

UK Atari Computer Owners Club. Contact PO Box 3, Raleigh, Essex.

Atom

Liverpool BBC and Atom User Group. Meets at Old Swan Technical College, Room C33 on first Wednesday of month at 7.30pm and at Birkenhead Technical College on third Thursday of month at 7.30pm. Nick Kelly, 051-525 2934 (evenings).

BBC

Inverclyde BBC Micro User Group. Meets on third Monday of each month at 9 St John's Road, Gourock, Renfrewshire. Contact Robert Watt on Gourock 39967.

Laserbug is an international user group for the BBC micro. Paul Barbour, 10 Dawley Ride, Colnbrook, Slough, Berks, 02812 30614.

Seebug. Sheridan Williams or David Graham at PO Box 50, St Albans, Hertfordshire AL1 2AR.

Bolton BBC micro and Electron User Group. Meets in Room E5/15, Bolton Institute of Higher Education, Deane Road, Bolton, Lancs. Contact Chris Snee on 0942 720984.

Bedford BBC network user group. Contact Tom Short/Mike Taylor at the Computer Centre, Bedford College of Higher Education, Cauldwell Street, Bedford. Tel 0234 45151.

Bournemouth BBC User Group. Meets at Lansdowne Computer Centre, 5 Holdenhurst Road, Bournemouth on first and fourth Wednesday of month at 7.30pm. Norman Carey, 0202 749612.

Brent/Barnet User Group. Meets on last Sunday of month. Joseph Fox, 4 Harman Close, London NW2 2EA.

Charlton & District (South Manchester) BBC Micro User Group. Contact Philip Harrison, 34 Holwood Drive, Manchester M16 8WS.

Chelmsbug. Contact Ian on Chelmsford 69174.

Cardiff BBC Microcomputer Club. Meets alternate Wednesdays at Applied Science Lecture Theatre, University College, Newport Road, Cardiff.

Format 40/80 Club (BBC Disk User Group). Send SAE to Peter Hughes, Five Marsh Street, Bristol BS1 4AA.

Huddersfield BBC User Group meets third Wednesday of each month. Contact Stuart Mallinson on 0484 685395, eves. or write to 34 Ryefield, Scholes, Huddersfield, West Yorks.

Liverpool BBC & Atom Group. Meets on the first Wednesday of every month at Old Swan Technical College, Room C33, 7.30-9.30pm, and on the third Thursday at Birkenhead Tech. College, 7.30-9.30pm. Contact Nik Kelly, 56 Queens Drive, Walton, Liverpool L4 6SH.

North London BBC Micro Users Group. Meets at The Prince of Wales, 37 Fortune Green Road, on Tuesdays at 7pm. Dr Leo McLaughlin, Westfield College, University of London, Kidderpore Avenue, London NW3 7ST, 01-435 0109.

Northern North Sea User Group. Potential members with helicopters welcome. Contact Ian Wilkins on board MSV Stadive, Brent Field, East Shetland Basin, Northern North Sea (100 miles off Shetland Islands).

Nottingham BBC User Group meets on second Monday of each month. Contact John Day on 0602 225660.

Norwich & District BBC Microcomputer User Group. Meets at Norwich City College on the first and third Tuesday of every month at 7pm. Subs: £3; students and OAPs £1.50. Contact Paul Beveriey, Department of Electronics, Norwich City College, Ipswich Road, Norwich NR2 2LJ.

Preston area BBC Micro User Group. Meets at Plough Hotel, Lea, Preston, on last Tuesday of month at 7.30pm. Duncan Coulter, 8 Briar Grove, Ingol, Preston, Lancashire, 0772 725793.

Tyne & Wear BBC User Club. Contact Ian Waugh, 13 Briardene Drive, Wardley, Tyne & Wear NE10 8AN.

Wakefield BBC Micro User Group. Meets at Holmfield House, Clarence Park, Wakefield, on first Wednesday of each month at 7.30pm. Contact R Bilton tel: Wakefield 382274.

Wellingborough BBC Owners User Group. Contact R Houghton, 49 Addington Road, Irthlingborough.

Witham (NAMEBUG) BBC Micro User Group. Meets at comprehensive school, Witham on second Thursday each month at 7.30pm. Dave Watts 0245 358127 after 7pm.

Basic

Welwyn Basic User Group meets on last Friday of each month at 7pm. Contact Debi Colthorpe, 36 Birds Close, Welwyn Garden City, Herts. Tel: Welwyn Garden (96) 30082.

Comal

London Comal User Group. Meets at Polytechnic of North London, Holloway, second Wednesday of month, term time. John Collins, 75 74111.

CUA

CUA User Group. Adrian Waters, 9 Moss Lane Romford, Essex.

Commodore ICPUG

Basildon. Contact Walter Green, 151 The Hatherley, Basildon, Essex.

Bloxham. Contact John Temple, Kirabanda, Rose Bank, Bloxham, Oxon.

Barnsley. Bob Wool, 13 Ward Green, Barnsley, South Yorkshire, 0226 85084.

Blackpool. Meets at Arnold School, Blackpool, on third Thursday of month. David Jarrett, 197 Victoria Road, Thornton Cleveleys, Blackpool FY5 3ST.

Birmingham. Contact J A McKain, PPI Ltd, 177 Lozells Road, Birmingham, tel: 021-544 0202.

Bournemouth & Poole. Contact Douglas Shave, 97 Canford Cliffs Road, Poole, Dorset BH13 7EP.

Bury St Edmunds. Contact Alan Morris, 30 Kelso Road, Bury St Edmunds, Suffolk.

Burnley. Contact John Ingham, 72 Ardwick Street, Burnley, Lancashire.

Canterbury SE. Meets at The Physics Lab, Canterbury University, on first Tuesday and Wednesday of month. R Moseley, Rosemount, Romney Hill, Maidstone, 0622 37643.

Carrickfergus. David Bolton, 19 Carrickburn Road, Carrickfergus, Antrim BT38 7ND, 09603 63788.

Chelmsford. Contact A G Surridge, 97 Shelley Road, Chelmsford, Essex.

Cheltenham. Meets at the Cheltenham Ladies College on last Thursday of month at 7.30pm. Alison Schofield, 78 Hesters Way Road, Cheltenham, Gloucester, 0242 580789.

Clwyd. John Poole, 6 Ridgway Close, Connah's Quay, Clwyd CH5 4LZ.

Corby. Peter Ashby, 215 Wincohn Way, Corby, Northamptonshire, 05363 4442.

Coventry. Meets at Stoke Park School and County College at 7pm on fourth Wednesday of month except July, August, December. Will Light, 22 Ivybridge Road, Stvyechale, Coventry, Warwickshire.

Derby. Meets at Derby Professional Colour every other Tuesday at 7pm. Robert Watts, 03322 72569.

Derbyshire & District. Meets every other Monday 7-9pm at Davidson Richards Ltd, 14 Duffiied Road, Derby. Contact Raymond Davies, 105 Normanton Road, Derby DE1 2GG.

Devon. Contact Matthew Stibbe, The Lawn, Lower Woodfield Road, Torquay, Devon.

Durham. North-East Pet and ICPUG. Meets at Lawson School, Burniey at 7pm second and third Mondays. Jim Cocallis, 20 Worcester Road, Newton Hall Estate, Durham, 0385 67045.

Dyfed. Simon Kniveton, 097 086 303.

Gosport. Meets at Bury House, Bury Road, Gosport, Hants at 7pm. Contact Tony Cox, 10 Staplers Reach, Rowner, Gosport, Hants.

Hainault. Meets at Grange Remedial Centre, Woodman Path, Hainault. Carol Taylor, 101 Courtlands Avenue, Cranbrook, Ilford, Essex.

Glasgow. Dr Jim MacBrayne, 27 Daidmyre Crescent, Newton Mearns. Glasgow, 041-639 5696.

Gloucester and Bristol Area. Meets last Friday of each month. Contact Janet Rich, 20 Old Court, Spring Hill, Cam, Gloucester.

Gloucester North ICPUG user group meets last Thursday of each month. Contract R. C. Harvey on 0240 527588.

Hampshire. Meets at 70 Reading Road, Farnborough, on third Wednesday of month. Ron Geere, 109 York Road, Farnborough, Hants, 0252 542921.

Hants. Contact Tony Cooke, 7 Russell Way, Petersfield, Hampshire GU31 4LD.

Hertfordshire North. Meets at Provident Mutual Assurance, Purwell Lane, Hitchin, on last Wednesday of month. B Grainger, 73 Minehead Way, Stevenage, Herts SG1 2HS, 0438 727925.

Kilmarnock. Meets at Symington Primary School on first and third Thursday of month at 7pm. John Smith, 19 Brewlands Road, Symington, Kilmarnock KA1 5RW, 0563 830407.

Liverpool. Meets at The Merchant Taylor School for Boys, Crosby, on second Thursday of month at 7pm. Tony Bond, 27 Ince Road, Liverpool L23 4UE, 051-924 1505.

Llandyssul. Contact F Townsend, The Hill, Rhydowen, Llandyssul, 05455 5291.

London. Alan Birks, 135 Queen Alexandra Mansions, Judd Street, London WC1, 01-430 8025.

London North. Barry Miles, Department of Business Studies, North London Polytechnic, Holloway Road, London N7, 01-607 2789.

Maidstone. Meets on the first Wednesday of every month contact Ron Moseley, Lord Romney Hill, Weavering Maidstone, Kent, 0622 37643.

Mapperley. Meets at Arnold & Carlton College, Digby Avenue, Mapperley every Friday. Contact Mark Graves, 8 Digby Hall Drive, Gunthorpe Road, Gedling, Notts NG4 4JT.

Merseyside. Meets fortnightly. Contact P Leather, 27 St Luke's Drive, Formby, Merseyside, tel: 36 74694.

National. Contact Membership Secretary, 30 Brancaotes Road, Newbury Park, Ilford, Essex 1G23 7EP.

Norfolk. Proposed new club. Contact J Blair, 7 Beach Road, Cromer, Norfolk.

Norfolk. Peter Petts, Bramley Hale, Wretton, King's Lynn, Norfolk PE33 9QS, 0366 500692.

Northampton. Contact Peter Ashby, 215 Lincoln Way, Corby, Northants.

Northern Ireland. Meets last Wednesday of each month. Contact David Weddell, 9 Upper Cavehill Road, Belfast BT15 5EZ, 0232-711580.

Northumberland. Graham Saunders, 22 Front Street, Guide Post, Northumberland.

Nottingham Commodore User Group meets fourth Monday of each month — contact Christopher Solomon on Nottingham 873228.

Rhyl. Contact Frank Jones, 77 Millbank Road, Rhyl, Clywd, 0745 54820.

Slough. Meets at Slough College on second Thursday of month at 7.30pm. Brian Jones, 53 Beechwood Avenue, Woodley, Reading RG5 3DF, 0734 661494.

Somerset. Contact Paul Montague, 12 Laxton Close, Taunton, Somerset.

South-East. Regional Group. Meets at Charles Darwin School, Jail Lane, Biggin Hill, Kent, on third and fourth Thursday of month at 7.30pm. Jack Cohen, 30 Brancaster Road, Newbury Park, Ilford, Essex, 01-597 1229.

South Midlands. Meets at 12 York Street, Stourport-on-Severn on last Thursday of month. M J Merriman at above address.

Staffordshire. 57 Clough Hall Road, Kidsgrove, Stoke-on-Trent.

Stourport-on-Severn. Meets last Thursday of each month. Contact M Merriman, 12 York Street, Stourport.

Teddington. G Squibb, 108 Teddington Park Road, Teddington, Middlesex, 01-977 2346.

Watford. Meets on second Monday of month. Stephen Rabagtiati, c/o Institute of Grocery Dist. Grange Lane, Letchmore Heath, Watford, Herts, 01-779 7141.

Witney. Contact Ian Blyth, 40 Wilmot Close, Witney 5171.

Wolverhampton. Meets on first and third Thursday of each month. Contact J Bowman, 6 The Oval, Albrighton, Wolverhampton, W Midlands.

Commodore 64

National Commodore 64 Independent Users Club. Contact Clive Embrey, 17 Santon Ave, Fallowfield, Manchester or Keith Bowden, 47 Park Ave, Barking, Essex, enclosing SAE.

Somerset 38911 Bytes Free User Group for Commodore 64 owners in the south-west. Contact P Montague on 0823 75630.

Commodore Pet

Blackpool. West Lancashire Pet Users Club. Meets at Arnold School, Blackpool on the third Thursday of month. D Jowett, 197 Victoria Road, East Thornton, Blackpool FY5 35T.

Southern Users of Pets Association. Howard Pilgrim, 42 Compton Road, Brighton BN1 5AN.

Pet User Group Crawley. Richard Dyer, 33 Parham Road, Ifield, Crawley.

Pet Users Education Group. Dr Chris Smith, Department of Physiology, Queen Elizabeth College, Camden Hill Road, London W8 7AH.

UK Pet Users Club. 360 Euston Road, London NW1 3BL.

Pet Users Group. Meets at Polytechnic of North London, Eden Grove, Room 320. On alternate Tuesdays, 6pm. Barry Miles 01-607 2789.

Pet User Club. Margaret Gulliford, 818 Leigh Road, Slough Industrial Estate, 0753 74111.

Independent Pet Users Group. 57 Clough Hall Road, Kielsgrove, Stoke-on-Trent, Staffordshire.

Commodore Vic

National Association of Vic-20 Owners. Contact S Tomananek, 20 Milner Road, Sherwood, Nottingham.

Burnley. John Ingham, 72 Ardwick Street, Burnley, Lancashire.

Clwyd. Contact A Stanners, 192A Willow Park, Queensferry, Deeside, Clwyd, Wales, 816603.

London. Vic Users Group. Meets on alternate Tuesdays at 6.30pm at Polytechnic of North London, Community Centre. Robin Bradbeer.

London. Contact Jim Chambers, Department of Psychology, University College London, Gower Street, London, WC1, 01-387 7050 x 413. Meets at University College, 26 Bedford Way, London WC1, third Tuesday of each month at 8pm.

Norfolk. J Blair, 7 Beach Road, Cromer, Norfolk, 0263 512849.

Compucolour

Caversham. Compucolour Users Group UK. Meets at Community Centre,

CLUBNET

Caversham Park Village twice a year. Peter Hiner, 11 Pennycroft, Harpenden, Hertfordshire, 05827 64872.

CP/M

Chiltern CP/M User Group. Contact Kenneth Hirst, Welwyn Garden City 28723.
Irish CP/M Users Group. Meets monthly in Dublin area. Doug Notley, Gardner House, Ballsbridge, Dublin 4, Dublin 686411.
London. CP/M User Group (UK). Subs £7.50. Produces newsletter. Contact David Powys-Lybbe, 01-247 0691.
UK CP/M Users Group. Lesley Spicer, 11 Sun Street, London EC2M 2QD, 01-247 0691.

COSMAC

COSMAC Users Group. James Cunningham, 7 Harrowden Court, Harrowden Road, Luton, Bedfordshire, 0582 423934.

DAI

DAI UK User Group, Manchester. Contact Dave Atherton, 16 Douglas Street, Atherton, Manchester. Tel: 0942 876210.

d-BASE 11

UK d-Base 11 User Group. Contact Ian Turner at Ashton Tate (UK) Ltd, on 0908 568866.

Decus

Decus UK & Ireland. Contact Tracey Pardoe, DECUS, PO Box 53. Reading, Berks RG2 0TW.

Digital Equipment

Digital Equipment Users Society. The Secretary, PO Box 53, Reading, Berkshire, 0734 387725.

Dragon

Cornwall St Austell Dragon User Group. Contact Martin Starkie on Par 4922.
Slough. Contact J Griffin, 1 Garrard Road, Britwell Estate, Slough. Tel: 75 35268.
Greater Manchester. Contact Melvin Franklin, 40 Cowlees, Westhoughton, Bolton, Lancs.
Nottingham Dragon User Group. Meets second Monday of each month. Contact Mike Johnson on Nottingham 288541.
Ware Dragon User Group. Contact Paul Kennedy, 61 Broadmeads, Amwell End, Ware, Herts. Tel: Ware 68264.

Epson HX20

London. Contact Terence Ronson, 25 Sawyers Lawn, Drayton Bridge Road, Ealing, W13, 01-998 1494.
Luton. The Dragon's Den. Contact D Buckingham, 83 Neville Road, Limbury, Luton, Beds.

Education

Birmingham. Education ZX80/81 User Group. Eric Deeson, Highgate School, Balsall Heath Road, Highgate, Birmingham B12 9DS.
Birmingham. MUSE. National body for co-ordinating activity in schools, colleges. Lorraine Boyce, MUSE Information Office, Westhill College, Weoley Park Road, Birmingham, 021- 471 3723.
Dublin. Computer Education Society of Ireland. Dairmuid McCarthy, 7 St Kevins Park, Kilmacud, Blackrock, Co. Dublin.
Middlesex. Educational Users Group. Offshoot of National TRS-80 Users Group. Dave Fletcher, Head Teacher, Beaconsfield First and Middle School, Beaconsfield Road, Southall, Middlesex.
Worcestershire. Mini and Microcomputer Users in Education. National organisation. R Trigger, 48 Chadcote Way, Catshill, Bromsgrove, Worcestershire B61 0JT.

Electron

Independent national user group for the Acorn Electron. Contact PO Box 50, St. Albans, Herts.

Forth

Forth Users Group. David Husband, 2 Gorleston Road, Branksome, Poole, Dorset BH12 1NW, 0202 764724.
Forth Interest Group UK. Meets at Room 408, South Bank Polytechnic London SE1 on the first Thursday of the month. Contact K Goldie-Morrison, Bradden Old Rectory, Towcester, Northants.

Forum

Forum 80 Users Group. Frederick Brown, 421 Endike Lane, Hull HU6 8AG.

FX-500P

FX-500-P Users Association. Max Francis, 38 Grymsdyke, Great Missenden, Buckinghamshire HP16 0LP.

Genealogists

Society of Genealogists Computer Interest Group. Anthony Camp, 01-373 7054.

Genie

Colour Genie User Group. Details of meetings/membership from Pat Doohan, secretary, Nottingham (0602) 278791.

Intel MDS

UK Intel MDS Users Group. Lewis Hard, c/o S.P.A.C.E., The Old Coach House, Court Row, Upton-on-Severn, Worcester WR8 0NS.

Ithaca Audio S100

Ithaca Audio S100 Users Group. Dave Weaver, 41 Dore Avenue, North Hykenham, Lincoln LN6 8LN.

Jupiter Ace

Jupiter Ace Users Group. John Noyce, Remsoft, 18 George Street, Brighton BN2 1RH.

Lynx

National Independent User-Group. Subs £9. Contact Robert Poat, 53 Kingswood Avenue, Sanderstead, South Croydon CR2 9DQ.

Mattel

Mattel Intellivision TV Game Group. Warrington 62215 after 4pm.

Medical

National Primary Health Care Group. Contact Dr Nicholas Robinson, 4 Alderney Avenue, Hounslow, Middlesex. Tel 01-577 5431.
BBC Medical Group. Contact Dr Ken Walton, 141 Lancelot Road, Wembley, Middx.
Sinclair Medical Group. Contact Dr Williams, The Medical Centre, Todmorden, Lancs.

Micronet

Micronet Independent User Group. Contact George Foot, Prestel Mailbox No. 892852867.

Nascom

Berkshire. Nascom Thames Valley User Group. Meets at Frogmore Hotel, Windsor, on Thursday fortnightly, 8pm. Mike Rothery, 37 Eaton Wick Road, Eton Wick, Windsor, Berkshire, Windsor 56106.
Birmingham Nascom User Group. Meets at Davenports Social Club, Granville Street, Birmingham on the last Thursday of month, 8pm. Martin Sidebotham, 021-744 3093.
International Nascom Microcomputer Club. 80 Oakfield Corner, Sycamore Road, Amersham, Buckinghamshire HP6 5EQ.
Merseyside Nascom User Group. Meets at Mona Hotel, St James Street, Liverpool, on the first Wednesday of month, 7.30pm. Mr T Searle, 051-526 5256.

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Newbrain
Wakefield Independent Newbrain User Group. Anthony Hodge, 15 St John's Court, Wakefield WF1 2RY.
Welwyn. Contact Angela Watkiss, 4 Ninnings Lane, Rabley Heath, Welwyn, Herts AL6 9TD.

Ohio
Ohio Scientific User Group. Tom Graves, 19a West End, Street, Somerset, 0458 45359.

Oric
Avon. Contact Bob Green, 1 Marlborough Drive, Worle, Avon, tel: 0934 21315.
International Oric Owners' User Group. Send £1.00 plus SAE for details to R. Green, 1 Malborough Drive, Worle, Avon or phone 0934 510279.
Oric Owners Group. Paul Kaufman, 3 Club Mews, Ely, Cambridgeshire.
Cardiff. 12 Tregarth Court, Creigiau, Cardiff.
Kent. Contact Roger Pyatt, 23 Arundel Drivé, Orpington, Kent with SAE or call 66 20281.

SCOTLAND
West Lothian Oric User Group. Contact Stuart Wilson at 21 Loch Aweway, Whitburn, West Lothian EH47 0RJ with SAE, or phone 0501 42673 (eves).
Strathkelvin Oric 1 User Group. Contact Colin Failes on 041-776 3654, or SAE to him at 24 Muirside Ave, Kirkintilloch, Glasgow G66 3PR.

Osborne
British Osborne Owners Group. J Anglesea, Flat 19, Rowan House, Mitton Road, Handsworth, Birmingham B20 2JR.

OSI
OSI UK User Group. Richard Elen, 12 Bennerley Road, London SW11 6DS.
OS-9 User Group, 1st Floor, 16 New North Parade, Huddersfield. Contact Mr. Ellis, Tel: 0484 516179 day or 0484 864130 after 6pm.

Pascal
Pascal User Group. Nick Hughes, PO Box 52, Pinner, Middlesex HA5 3FE.

PDP
Buckinghamshire. PDP8 User Group. Nigel Dunn, 21 Campion Road, Widmer End, High Wycombe, Buckinghamshire, 0494 714483.
Hertfordshire. PDP11 User Group. Pete Harris, 119 Carpenter Way, Potters Bar, Hertfordshire EN6 5QB, 0707 52091.

Pilot
UK Pilot User Group. Alec Wood, Wirral Grammar School for Boys, Cross Lane, Bebington, Wirral, Merseyside LG3 3AQ.

Prestel
ACC National Prestel Committee. Administrates Club Spot 800 (hobbyists on Prestel). Rupert Steele, St John's College, Oxford OX1 3JP.

Research Machines
Leamington Spa. West Midland RML User Group. Spencer Instone, c/o 59 Avenue Road, Leamington Spa.
Newcastle. NERML 380Z User Group. Meets monthly at Micro-Electronics Education Centre of the Polytechnic Coach Lane Campus. Mr Hatfield or Mr Reed, Computer Unit, Northumberland Building, Newcastle Polytechnic, 0632 326002.
Research Machines National User Group. Contact Jim Cooley, RMNUG, c/o Research Machines Ltd., PO Box 75, Oxford.
West Midlands RML User Group. Contact 0926 38751.

Sharp MZ80
Aberdeen. International Sharp Users Group. Graham Knight, c/o Knights Computers, 108 Rossemount Place, Aberdeen, 0224 630526.
Essex. Sharp MZ80K User Group. Joe Street, 16 Elmhurst Drive, Hornchurch, Essex RM11 1PE.
Leeds. Sharp PC1211 Users Club. Jonathan Dakeyne, 281 Lidgett Lane, Leeds LS17 3AQ.
Leeds, Sharp User Group. Postal only. Enquiries to Craig Kennett, 17 Moseley Wood Way, Cookridge, Leeds 16 7HN.
Somerset. Sharp MZ80 Users Club. Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset BA21 4AE.

Sinclair
Aylesbury. Sinclair ZX Computer Club. Ken Knight, 0296 5181.
Brighton. ZX Users Group. J Ireland-Hill Jnr, 145 Godwin Road, Hove, Brighton.
Colchester Sinclair User Group. Meets fortnightly. Richard Lawn, 102 Prettygate Road, Colchester, Essex.
Cardiff. ZX Club. Meets on last Sunday of month, 2pm. Mike Hayes, 54 Oakley Place, Grangetown, Cardiff, 0222 371732.
Doncaster & District Sinclair User Group meets at Gracehoime Social Club, Doncaster, each Wednesday at 7pm. Contact Tony Cooper on 0302 853124.
Folkestone. ZX Spectrum User Group for under 16s. Contact D. J. Parish, Brookhouse, Etchinghill, Folkestone, Kent.
Glasgow. ZX80/81 User Group. Ian Watt, 10 Greenwood Road, Clarkston, Glasgow, 041-638 1241.
Gloucester. Sinclair Spectrum user group. Contact B Ledbury, 8 Linnet Close, Gloucester. Tel 0452-23186.
Liverpool. ZX Computer Club. Meets each Wednesday at 7pm in the Youth Activities Centre. Contact Keith Archer on 051-236 6109.
London. National ZX User Club. Tim Hartnell, Interface, 44-48 Earls Court, London W8.
London. Sinclair User Group. Meets at Polytechnic of North London, Room 2-5 Tower Block. Monday, 6.30pm. Irving Brand, Polytechnic of North London, Holloway Road, London.
Harlow ITEC Spectrum User Group. Contact K Sutton on Harlow 442034.
London. Aquarius Users' Group. Contact L Leboff, Aquarius User Group, 4th Floor, Hyde House, The Hyde, London NW9.
Manchester Sinclair Users Club. Meets at Longsight Library, 519 Stockport Road, Longsight, Manchester, every Wednesday at 7.30pm. Call 061-225 6997 or 061-445 6316.
Nottingham ZX Spectrum Club. D Beattie, 53 Kingsley Crescent, Sawley, Long Eaton, Nottingham NG10 3DA. Enclose SAE please.
Nottingham Sinclair User Group meets third Monday of each month. Contact Graham Basford on Nottingham 654522.
Scunthorpe. Grange Farm ZX Computer Club, Scunthorpe, South Humberside. Meets first and third Tuesday of month. Contact Sheila & Fred Wilkinson, 0724 842970.
Staffordshire. ZX80 National Software Association. 15 Woodlands Road, Wombourne, Staffordshire WV5 0JZ.
Sudbury. Cornard Sinclair User Group meets bi-weekly on Wednesdays. Contact Neil MacDonald, 15 Potkiln Road, Gt Cornard, Sudbury, Suffolk.
Suffolk. ZX Amateur Radio User Group. Paul Newsman, 3 Red House Lane, Leiston, Suffolk, SAE essential. No telephone inquiries.
Surrey. Guildford ZX80/81 Users Group. Meets Fridays. A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, 0483 62035.
Surrey. ZX80/81 User Club. David Bigden, PO Box 159, Kingston-upon-Thames, Surrey KT2 5UQ.
West Sussex. Hassocks ZX Micro User Club. Paul King, 25 Fir Tree Way, Hassocks, West Sussex.
Sinclair IQLUG. Independent QL User Group. Contact Brian Pain in Milton Keynes on 0908 564271.

Sirius
Sirius User Group. Ray D'Arcy, Sirius User Club, The Microsystems Centre, Enterprise House, 7-71 Gordon Street, Luton, 0582 412215.

68XX
68 User Group. Meets every fourth Tuesday throughout the year. Contact 41 Pebworth Road, Harrow, Middlesex.

6809 User Group
6809 User Group. Contact Mr Gibbons, 9 St. Thomas Hill, Launceston, Cornwall.

Software
London. Software Group. Meets at Polytechnic of North London, Room 2-3 Tower block Thursday, 6pm. Mike Duck at Polytechnic of North London, Holloway, London N7.
Oxford. Program of the Month Club. Mr Durrant, 55 St Thomas Street, Oxford OX1 1JG, 0855 250333.

Sorcerer
Liverpool European Sorcerer Club. Monthly meetings. Colin Marle, 32 Watchyard Avenue, Formby, near Liverpool L37 3JU, 07048 72137.
Surrey. Exidy Sorcerer User Group. Andy Marshall, 44 Arthurs Bridge Road, Woking, Surrey GU21 4NT.

Spreadsheet
International Electronic Spreadsheet Users Group. UK Alpha House, 7th Floor, Rowlandsway, Manchester M22 5RG.

Tandy
Tandy Model 100 NEC PC-8201 User Group. SAE to Remsoft, 18 George Street, Brighton, tel: 0273 602354.

Tangerine
Avon. Tangerine Users Group. Bob Green, 1 Marlborough Drive, Worle, Avon, 0934 21315.
Bristol. Tangerine Homebrew. A Coales, 35 Mogg Street, St Werburghs, Bristol BS2 9UB.

Texas Instruments
Brighton. Contact Clive & Audrey Scally, 40 Barrhill, Patcham, Brighton, Sussex.
Ireland. Proposed new club. Contact Mrs Ann Flynn, 53 Georgian Close, North Road, Drogheda, Co. Louth, Eire.
Leeds. TI99/4A User Group. Meets at 30 Gipton Wood Road, Leeds 8, Mondays 7pm. I Youlden, 0532 401408.
Manchester. TI User Group. T Grimshaw, 21 Allingham Street, Longsight, Manchester.
Manchester. TI9900 User Group. Chris Cadogan, Department of Computer Science, University of Manchester M13 9PL.
Maidenhead — UK Texas Instruments User Group. Contact Katie Lomax, PO Box 190, Maidenhead, Berks, Tel: 0628 71696.
Nationwide TI Users Group. Contact TI99/4A Exchange, Independent TI Users, 40 Barrhill, Patcham, Brighton BN1 8UF.

Triton
Triton User Group. Nigel Stride, Transam Ltd, 12 Chapel Street, London NW1, 01-402 8137.

TRS-80
Birmingham. National TRS-80 User Group. Meets at Adam & Eve Pub, 1st Floor, Bradford Street, Birmingham on last Friday of month. Michael Gibbons, 1 New Street, Castle Bromwich, Birmingham B38 9AP, 021-747 2260.
Chelmsford. TRS-80 User Group. Michael Dean, 22 Roughtons, Galleywood, Chelmsford, Essex.
Durham. North East TRS-80 User Group. Meets at Information Technology Centre, Gateshead on the third Wednesday of month, 7pm. J Dunn, 8 Ettrich Terrace, North Gateshead, County Durham.
Edinburgh. Scottish TRS-80 and Genie User Group. Meets at Mansion House Hotel, Milton Road, second Thursdays of month. Dick Mackie, 72 Morningside Drive, Edinburgh EH9 1DX, 031-447 6651.
Herts. Contact Reg Smith, 24 Sempill Road, Hemel Hempstead, Herts, 0442 60085.
Hull & District TRS-80/Beeb Users Group. Meets second Tuesday of month and Thursday 16 days later at Psychology Dpt, Hull University. Contact J Lawrence, 2a Hall Road, Hull HU6 8SA.
Isle of Wight. TRS-80 User Club. Meets at London Hotel, Ryde on last Friday of month. 7.30pm. Sean Coulson, 0903 614589.
Kent. TRS-80 User Group. Alan Reid, 22 Woodeys Road, Rainham, Kent, 0634 367012.
Greater Manchester. Northwest TRS-80 User Group. Meets at Barton Aero Club, Barton Aerodrome, Irlam, near Manchester on last Wednesday of month, 8pm. Melvin Franklin, 40 Cowlees, Westhoughton, Bolton, Lancs.
Lancs. TRS-80 Colour Computer Group. Subs: £3. Contact Ian Wild, 53 Darnton Road, Ashton-U-Lyne, Lancs OL6 6RL.
Liverpool. Merseyside TRS -80/Video Genie User Group. Meets second Thursday of month. 7.15pm. Peter Toothill, 101 Swanside Road, Liverpool L14 7NL. 051-220 9733.
London, SW. TRS-80 User Group. Ron Everitt on 01-394 2123.
Merseyside. TRS-80 User Group. N Rushton, 123 Roughwood Drive, Northwood, Kirby, Merseyside.
Milton Keynes. National TRS-80 and Genie User Group. Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes.
Nottingham. TRS-80 Genie Users Group. Meets at Wilford Moderns Rugby Club House on first and third Wednesday every month at 7.30pm. Contact Geoffrey Hillier, 5a Gregory Street, Lenton, Nottingham NG7 2LR, Nottingham 783938.
Nottingham. East Midlands TRS-80 User Group. Mike Costello, 15 Langbank Avenue, Rise Park, Nottingham NG5 5BU, 0602 751753.
London. TRS-80 Genie Group. Meets at Central Common Room, The Residency, Northwick Park Hospital on first Sunday of month. Dr Nick Robinson, Central Room, The Residency, Northwich Park Hospital.
Northants. TRS-80 User Group. Meets at Welwyn Park Community Centre on alternate Thursdays at 7pm. Neil Griffiths, 0858 65718.

Colour Genie
International Colour Genie Users Group. Write with SAE to The Secretary, NCGUG, 46 Highbury Avenue, Bulwell, Nottingham, 0602 278791.
National Colour Genie User Group. Marc Leduc, 46 Highbury Avenue, Nottinghamshire NG6 9DB.

UCSD
Hants. UCSD System Users Society. John Ash, Dicoll Data Systems Ltd, Bond Close, Kingsland Estate, Basingstoke, Hants RG2 0QB.
Oxford. UCSD Pascal UK Users Group. Malcolm Harper, Oxford University Computing Laboratory Programming Research Group, 45 Banbury Road, Oxford OX2 6PE.

Unix
Unix User Group UK can be contacted at Langley House, Langley Mill, Notts.

6502
Bedfordshire. 6502 User Group. Walter Wallenborn, 21 Argyll Avenue, Luton, Bedfordshire LU3 1EG, 0582 26927.
Hants. 6502 User Group (Southern Region). Steve Cole, 70 Sydney Road, Gosport, Hants.

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Five month old Oric Owners Users Group (International) Limited's current project is to promote the Oric as a machine for the small business.

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The group also aims to produce hardware add-ons for the Oric and Atmos at favourable prices to members, as well as software and hardware packages for the Oric, which will continue to be the mainstay for some time to come.

The group has recently moved to bigger premises — it was formerly based in Mr Green's home which proved rather cramped, due to 8,000 enquiries which he received in the first month of the group's existence.

Members meet up at computer shows around the country to swap ideas and information and though no precise membership figures are available, Mr Green is kept very busy.

Members are notified of future meetings by post and the £10 annual membership fee covers monthly copies of the magazine 'Oric Computing'.

Wendie Pearson

Name Oric Owners Users Group (International) Limited **Venue** By arrangement **Meetings** on random basis — advised by post **Contact** Bob Green, 0934 516681.

USER GROUPS

AVON

Bristol Berkeley Nuclear Laboratories Club. Contact Neil Walker, 53 Wolfridge Ride, Alveston, Bristol, 0454 414262.

Bristol Micro Computer Club. Meets at the Pavilion, Southend Road, Filton, Bristol, every other Tuesday. Darryl Collins, 60 Mackie Rd, Filton, Bristol BS12 7NA, 0272 792982.

Bristol Format 40/80 Disc Club, for BBC disk users. Contact Peter Hughes, Format 40/80 Disc Club, c/o The Lending Library, Five Marshal Street, Bristol BS1 4AA.

Multi-User Club Valerie Boyde-Shaw, Nailsea 851337.

Worle Computer Club. Meets at Woodsprings Inn Functions Rooms on alternate Mondays at 7-10.30pm. H Bennett, 0934 514902 or F Feeney, 0934 833122.

BEDFORDSHIRE

Bedford Amateur Computer Club. Meets at Star Rowing Club, Bedford, on the first and third Tuesday of month 8pm. Rowan Bird, 74 High Street, Great Barford, MK44 3LB, 0234 870763.

Chiltern Computer Club. Meets at Five Bells, Eaton Bray, Near Dunstable, Leighton Buzzard on second and fourth Monday of each month. Contact Steve Betts, 42 Wallace Road, Eaton Bray, OU6 2DF. 0525 220922.

Luton College Computer Club. John Rodger, 0582 3411.

Luton Computer Club. J P Fletcher, 1 Trowbridge Gardens, Luton, LU2 7JY, 0582 450687.

BERKSHIRE

Bracknell Computer Club meets second and fourth Thursday of each month at Easthampstead Community Centre, 7pm. Contact Paul Tilsley, 31 Pembroke, Hanworth, Bracknell, Berkshire.

Easthampstead Computer Club. Meets at Easthampstead Park School, Bracknell, on the first Wednesday in month at 8pm. Brian Poulton, 0344 84423.

Crown Wood Computer Club. Meets at Crown Wood Community Centre, Bracknell, each Thursday at 8pm. Ray Ayrton 0344 59264.

BIRMINGHAM

Birmingham Amateur Computer Club. Meets at Free Church Hall, Land Lane, Marston Green, Birmingham on first and third Thursday of each month at 7.30pm. Contact Les Moore, Secretary, Wolverhampton 725340.

Primrose Hill Centre Micro Club. Meets Wednesday at 7.15pm at the Primrose Hill Centre, Shannon Road, Kings Norton, Birmingham. Contact Keith Belfield. Tel: 021-459 8995.

BUCKINGHAMSHIRE

Aylesbury Computer Club. Meets at Quarrendon Youth Club every Friday at 7.30pm and at Mandsville County Secondary School the first Thursday of each month at 7pm. Ken Knight, 22 Mount Street, Aylesbury, 0296 5181.

Chiltern Microcomputer Club. Meets at the Garden Centre, School Lane, Chalfont St Giles, on the first Wednesday of each month. Mrs W Tibbitts, Ellwood, Deanway, Chalfont St Giles. 024 07 4906.

Iver Computer Club. P A Seal, 1 Ormonde Flats, Church Road, Iver Heath, 0753 652792.

Iver Computer Society meets at Huntsmoor room, Iver Village Hall on the second and fourth Thursday every month at 7.30. John Haigh, 141 Leas Drive, Iver, SL0 9RP.

CAMBRIDGESHIRE

Cambridge Microcomputer Club, meets on the third Wednesday of month. Derek Tripp, 3 Spurgeons Avenue, Waterbeach. 0223 315662.

Peterborough Personal Computer Club meets at Crosfield Electronics Social Club, fortnightly on Mondays. Andrew Pike, 0733 44342 after 5pm.

CHESHIRE

Altrincham Computer Club. Meets at N. Cestrian Grammar School, Durham Road, Altrincham, fortnightly. Martin Hickling, 39 Barrington Road, Altrincham, WA14 1H2, 061 941 4547.

Brunel Computer Club. Meets at St Werburgh Community Centre on alternate Wednesdays at 7 to 10pm. Mr R Simpson, 4 The Coots, Stockwood.

Chester Computer Club. Contact W Collins, 37 Garden Lane, Chester, Cheshire.

Crewe Computer Users Club meets at Buffaloes Club, Earl Street, Crewe, on the third Thursday of each month at 8pm. Bram Knight, 0270 623375.

Holmes Chapel Micro Club meets at Leisure Centre, Holmes Chapel at 7.30 to 9.30pm on the first and third Tuesday of month. Margaret Baker, 1 Helton Close, Crewe. 0477 34238.

Kinder Peek Computer Club meets at Bew Mills School every Monday. John Eary, New Mills 43870.

Kettleshulme National Computer Buyer's Club. Send SAE to Barry Edwards, Laneside House, Paddock Lane, Kettleshulme, nr Stockport, Cheshire.

New Mills & District PCC meets at New Mills School, fortnightly on Fridays at 7 to 9.30pm. Mr G M Flanagan, 11 Sundown Close, New Mills, Stockport, SK12 3DH, 0663 44051.

Northwest Computer Club meets fortnightly. John Lightfoot, 13 Aston Drive, Frodsham, Warrington, WA6 7PU. 0728 31519.

Northwest Computer Club, weekly meetings. Tom Wyatt, 29 Summer Lane, Halton, Runcorn Cheshire WA7 5PG. Runcorn 77545.

Mid-Cheshire Computer Club meets at Winsford Library on the second Friday every month at 7.30pm. Simon Sadler, Winsford 53339.

Stockport Software Exchange Club. Send SAE to P Redford, 53 Cavendish Road, Hazel Grove, Stockport, Cheshire.

CLEVELAND

Cleveland Micro Club meets on the second and third Tuesday of each month, under 18s on second of month, over 21s on third Tuesday of month. J Telford, 13 Weston Crescent, Norton.

Stockton Amateur Computer Club meets at YMCA, Stockton, each alternate week at 7-9pm. Peter Cheshire, 60 Croft Road, Eaglescliffe, Stockton-on-Tees, TS16 0DY.

CORNWALL

Cornish Radio Amateur Club — Computing Section. Bob Reason, 24 Mitchell Road, Camborne.

Cornwall Area PAICC meets at the Penzance Micro Centre every Friday. S Zenith. Hayle 754845.

St Austell Computer Club and Computer Town meets at ECIP Labs, Penpewan Road, fortnightly on Mondays at 7.30pm. N G Day, 2 Cilendale Close, St Austell.

CUMBRIA

Ambleside Computer Club. Contact Jeremy Westerman, 8 Hill Top Road, Ambleside, Cumbria. Tel: Ambleside 2452.

DERBYSHIRE

Chesterfield Micro Club. Meets each Friday at 7pm. John Charter 37555 or Alan Crofts 30262.

Derby Micro Society meets at Littleover Church Hall, Sheperd Street, first and third Thursday of each month at 7pm. Frank Taylor, 0332 559334.

Glossop Computer Club. John Dearn, 2 Spinney Close, Glossop.

DEVON

Adventure Helpline Club for desperate adventurers. Contact C.P. Wong, 20 Stangray Avenue, Plymouth, Devon.

Brixham Computer Club meets each Wednesday night at 7.30pm at the Golden Lion, New Road, Brixham, Devon.

Computers Against the Bomb. Contact Paul Couchman, 29 Clifton Place, North Hill, Plymouth, Devon.

Exeter & District Computer Club meets at Exeter School, Magdalene Road, Exeter, on the second and fourth Tuesday every month. T G Holden, 14 Greenville Avenue, Teignmouth, TQ14 9NT.

Exeter & District Amateur Computer Club meets second Tuesday every month. Doug

CLUBNET

Bates, Fortescue House, Stoke Cannon, Exeter. Specialist meetings on third and fourth Tuesday.
Okehampton Computer Club. Contact Cherri Graebe, Okehampton 3523, or Okehampton Community College, Okehampton 3800. Meets 7pm each Monday during term time.
South Molton Computer Club. Meets at South Molton Tool Hire, Dootson House, Cooks Cross Industrial Estate, South Molton, North Devon, each Thursday at 7pm. Contact Nick Hews on 07695 3446.
Torbay Users Computer Club meets at Devon Computers, 39 Totnes Road, Paignton on Mondays fortnightly.

DORSET

Bournemouth Area Computer Club meets at Kinson Community Centre on the third Wednesday every month. Peter Hibbs, 54 Runnymede Avenue, Bournemouth, BH11 9SE. 0202 576547.
TOPIC meets at Canteen English Truck Centre on the second and fourth Wednesday every month at 7pm. David Washford, 1 Alexander Road, Bounemouth, BH6 5JA.
Purbeck Computer Club, contact 31 North Street, Wareham, Dorset BH20 1AD.

DURHAM

Darlington Computer Club, weekly meetings L Boxell, 8 Vane Terrace, Darlington DL3 7AT. 0325 67766.

ESSEX

Epping Computer Club meets Tuesdays at 7.30pm at Centrepoint, Epping. Call G. Rees on Epping 75055.
Benfleet Computer Club. 30 Webber House, North Street, Barking.
Great Dunmow Computer Club. Contact T Coombs, 4 Oakroyal House, Oakroyal Avenue, Great Dunmow, Essex CM6 1HQ.
Brentwood Amateur Microcomputer Club, meets once a month. A R Holland, 0277 221620.
Springfield Computer Club meets on the first Friday of every month. Stephen Cousins, 1 Aldeburgh Way, Springfield, Chelmsford, CM1 5PB. 0245 50155.
Canvey Computer Club. Contact Dean Williams, 17 Mornington Road, Canvey Island, Essex SS8 8AT.
Colchester Microprocessor Group meets at University of Essex on the second and fourth Wednesday of every month at 7.30pm. Information Centre, University of Essex, near Colchester.
Colchester Computer Society. Meets at Severalls Hospital Social Club, Colchester. Contact A Potten, 14 Foxmead, Rivenhall, Witham, Essex CM8 3HD, Witham 516335.
Elsenham Computer Club meets on first Tuesday of each month. Contact Ray Franklin 0279 815088.
National Westminster Personal Computer Society, 412 Eastern Avenue, Gants Hill, Ilford. P J Moore, 01-554 9699.
Stanway School Computing Club, only school members at present. G Floyd, c/o Physics Department, Stanway School, Stanway, Colchester.
Modem 80 Computer Link Club, meets Wednesday evenings. Contact E Ferrant, 55 South Street, Barming, Kent, 0622 27885.
Nailsea Multi-User Club. Contact Valerie Boyde-Shaw, 0272 851337.
Romford Club, a new club. Mr D Norden, 138c Church Road, Romford.
Roundacre Micro Computer Users Club. Meets at the Roundacre Youth House, Laindon Link, Basildon every Wednesday at 7.30pm. Contact Mrs L Daden, Basildon 285119.
South East Essex Computer Society meets at Hockey Club at Roots Hall, near Southend Football Stadium on Wednesday at 7.30pm. Robin Knight, 128 Little Wakering Road, Little Wakering, Southend-on-Sea. 0702 218456.

GLOUCESTERSHIRE

British Amateur Electronics Club. Mr J Margetts, 3 Bishopstone Close, Golden Valley, Cheltenham.
Cheltenham Amateur Computer Club meets on the third Tuesday of each month at 7.30pm. Mike Pullin 0242 25617.
GCHQ. D W Adam, 16 Court Road, Prestbury, Cheltenham.
Cheltenham Amateur Computer Club meets at Prestbury Scout Headquarters, on the third Tuesday of every month at 7.30pm. M Hughes, 36 Riverviews Way, Cheltenham.

HAMPSHIRE

Commodore Computer Club. Meets on the first Friday of every month at Bury House, Gosport Community Centre, Bury Road, Gosport at 7pm. Brian Cox. Fareham 280530.
Fareham and Portsmouth Amateur Computer Club. Alan Smith, c/o Francis Close, Lee-on-the-Solent, Gosport, Hants PO13 8HB. 0705 550907.
Portsmouth Co-operative Computer Club — contact A. May on 0705 820339.
RAF Odiham Computer Club. Contact c/o Officer i/c, Royal Air Force, Odiham, Nr Basingstoke, Hants.
Southampton Amateur Computer Club meets at Crestwood Centre, Shakespeare Road, Boyatt Wood, Eastleigh, Hants. on the second Wednesday of every month at 7.30pm. Paul Blitz. Chandlers Ford 69050.

HEREFORD

Hereford Amateur Computer Club, proposed new club. Stuart Edinborough, 2 Warwick Walk, Bobblestock, HR4 9TG. 0432 276970.

HERTS

Elsenham Computer Club. Meets on second Wednesday of each month at the New Village Hall Committee Room, Elsenham, Bishop's Stortford. R. Franklin 0279 815088
Sawbridgeworth Computer Club, meets at Sawbridgeworth Parish Hall, 7pm, Fridays. M. Marwood, 38 Sayesbury Road, Sawbridgeworth, Herts, CM21 0EB.

HUMBERSIDE

Bridlington Microcomputer Club. Meets 7.30pm alternate Fridays at Old Star Inn, High Street, Bridlington. Contact D Compleman, 0262-601859.
Grimsby Computer Club meets at Grimsby Central Library fortnightly on Mondays at 7.30pm. Ian Fell, 0472 49248.
Scunthorpe & District Microprocessor Society meets at Community Centre, Lindun Street, Scunthorpe, every Tuesday at 7.30pm. G Hinch, 21 Old Crosby, Scunthorpe, South Humberside DN15 8PU.

KENT

Canterbury ACC proposed new club. Contact L Fisher, 21 Manwood Avenue, St Stephens, Canterbury, CT2 7AH.
Gravesend Computer Club. Meets at School Room Extra Tuition Centre, 39 The Terrace, Gravesend. Contact c/o The Extra Tuition Centre, 0474 50677.
Medway Amateur Computer & Robotics Organisation. Meets at 7.30pm on first Tuesday and third Wednesday of every month. Annual subs £5. Contact Paul Cameron, Unit 3, Walderslade Centre, Walderslade Road, Chatham, Kent, 0634-63036.
North Kent Amateur Computer Club meets at Lecture Theatre, Charles Darwin School, Jail Lane, Biggin Hill, on the first Thursday of every month at 7.30pm. Iain House, 28 Canadian Avenue, Catford SE6 3AS. 01-690 5441.
Orpington Computer Club meets at The Large Hall, Christ Church, Chaterhouse Road, Orpington, every Friday at 8pm-10.30pm. Mr R Pyatt, 23 Arundel Drive, Orpington, Kent BR6 9JF. Orpington 20281.
National Personal Computer User Association. Eric Keeley, 11 Spratling Street, Manston, Ramsgate, Kent.
Sevenoaks School Computer Club. G Sommerhoff, Technical Centre, Sevenoaks School, Sevenoaks, Kent. 0732 456340.
Tonbridge & Tunbridge Wells ACC. Ray Szatkowski, 1 Cromer Street, Tonbridge. 0732 355960.

LANCASHIRE

Blackburn Micro Computer Club. Roger Longworth, 12 Sharp Close, Accrington.
Bolton Computer Club meets at Bolton Institute of Higher Education, Deane Road, Bolton, on Thursdays. Bill or Suzi Hatton, 0204 792803.
Burnley Computer Club. Meets at Burnley Technical College on Tuesdays, 7.30-11pm. Contact Clive Tallon, 27 Basnett Street, Burnley, Lancs.
Chorley Computer Club meets at Townley Arms, Chorley, every other Tuesday at 8pm. Tony Higson, 23 Brock Road, Chorley, Lancs. Chorley 68429.
Ribble Valley Computer Club meets at Staff Canteen, Pendle Carpets Ltd, West Bradford, on the second and fourth Monday of month at 7-9pm. Contact Ian Thornton-Bryar, 25 Southfield Drive, West Bradford, Clitheroe, BB7 4TU.
Lancaster & Morecambe Computer Club. Sarah Blackler. 0524 33553
Lancaster Computer Club meets each Tuesday at 6.30pm. Contact Brian Sheldon on 0524 423134.
South Chadderton Computer Club meets at Turf Lane Centre, Turf Lane, Chadderton, on Thursdays at 7-9.30pm. David Sholes, 18 Beech Avenue, Oldham, Lancs.

LEICESTERSHIRE

East Leake Computer Club. Andrew Jones, 59 Bateman Road, East Leake, Loughborough, LE12 6NN.
Hawker Siddeley Computer Club. Contact R Wrathall, 6 Naseby Drive, Loughborough LE11 0WU.

LINCOLNSHIRE

Lincoln Computer Club, meets at The Cardinal's Hat, 238 High Street, Lincoln (entrance on Grantham Street) on first and third Wednesday of each month, except August. Contact Jeffrey Joy, 23 Cross O'Cliff Hill, Lincoln, 0522 28252.
Skegness Computer Club, meets at County Hotel every other Monday, 7.30-9.30pm. Reg Potter, 118 Beresford Avenue, Skegness. 0754 3594.

LONDON

Association of Computer Clubs. Contact Rupert Steele, 17 Lawrie Park Crescent, London SE26, 01-778 6824. National Club.
Croydon Microcomputer Club. Meets at Croydon Central Reference Library. Contact Vernon Gifford, 01-653 3207.
East London Amateur Computer Club meets at Harrow Green Library, Cathall Road, E11, on the second and fourth Tuesday of month at 7-10pm. Fred Linger on 01-554 3288.
Forum-80 London. Leon Jay, 01-286 6207.
Forum-80 Wembley. Victor Saleh, 01-902 2546.
The Foundation, c/o Princes Street, Tottenham, London N17. Postal club for science fiction/fantasy software. Contact David Hodson, 01-808 4053.
Harrow Computer Group meets at Harrow College of Higher Education, Room W24, Northwick Park, on alternate Wednesday at 7pm. Bazyle Butcher, 01-950 7068.
Imperial College Micro Club meets at room 401 in the Royal School of Mines on Wednesdays at 2pm. Jan-Simon Pendry, Micro Club, c/o Imperial College Union Office, Prince Consort Road, London SW7 2BB.
London School Computer Club. Burlington Danes School, Dane Building, DuCane Road, Hammersmith.
Metropolitan Police Amateur Computing Club meets on the first Thursday of month at 7pm. S Farley, 01-725 2428.
68 Microgroup meets at Regents Park Library, Robert Street, NW1, on the third Tuesday of month at 7.30pm. Jim Anderson, 41 Pebworth Road, Harrow, Middlesex.
North London Computer Club meets at the Polytechnic of North London, Holloway, N7 8DB, on Monday, Tuesday, Wednesday and Thursday during term time and one evening a week during holidays. Robin Bradbeer, 01-607 2789.
Paddington Computer Club meets at Paddington College, 25 Paddington Green, W2 1NB. Peter Hill, 01-723 5762.
Post Office HQ Microcomputer Club meets at room B145, River Plate House, 12-13 South Place, off Moorgate, on the second Thursday of month. Vernon Quaintance, British Telecom Enterprises, Cheapside House, 138 Cheapside EC2U 6JH. 01-726 4716.
Queens Crescent Computer Club. Meets at Queens Crescent Library, 165 Queens Crescent, London NW5, 01-485 4551.
The SOBAT Computer Club meets once a fortnight. Mr T Kayani, 12 Calderon Road, London E11.
South East London Microcomputer Club — contact Mark Benson on 01-856 5555 x 313.
Southgate Microcomputer Club meets at Room B106 Southgate Tech, fortnightly on Wednesdays at 7.30pm. Kevin Pretorius 01-882 2262. See Preston page 25820645.
West London Personal Computer Club meets at Back room, Fox & Goose pub, Hanger Lane, Alperton, on the first Tuesday of month at 7.45pm. Graham Brain, 01-997 8986.

MANCHESTER

Manchester Computer Club meets at the Department of Computer Science, Manchester University, Oxford Road, on the first and third Thursday of month at 7.30pm. David Wade, 061-941 2486.
Small Business Computer Users Club. Proposed new club to meet the last Tuesday of month. K Wadsworth, 061-740 7232 after 5pm.
South Trafford Microcomputer Club. Meets fortnightly. Contact Ian White, 16 Leicester Avenue, Timperley, Altrincham WA15 6HR, 061-969 2080.

MERSEYSIDE

Merseyside Microcomputer Group meets at Merchant Taylor's School, Crosby, on second Thursday month. Mr F Shaw, 14 Albany Avenue, Eccleston Park, Prescot. 051-426 5536.
Southport Computer Club meets weekly. Ian Bristone, 28 Weld Road, Southport, Merseyside PR8 2DL. 0704 64524.
Wirral Microcomputer Users Group meets at Birkenhead Technical College every Monday. J Phillips, 14 Helton Close, Birkenhead, Merseyside L43 9HP.
Wirral Computer Club. Contact Gary Metcalfe, 24 Marlston Avenue, Irby, Merseyside.

MIDDLESEX

Brigadier Computer Club. Meets on the first and third Monday of every month at Brigadier Youth Centre, Brigadier Hill, Enfield at 7.30 pm. Contact Steve Ward, 28 Brodie Road, Enfield, Middx EN2 0EU, 01-363 3786.
Micromodeller User Association. Meets three times a year. Contact Phillip Matthews, Phillip Morris House, 21 High Street, Feltham TW13 4AD, 01-751 6388.
Sunbury Computer Club meets at St Benedicts Hall, Napier Road, Ashford, on the last Tuesday of month at 8pm. Simon Taylor, 8 Priory Close, Sunbury-on-Thames, Middlesex. Simon Clark, 83 Watling Street, Towcester, Northants NW12 7AG.
Middlesex Micro Club. Contact Pete Kavner, 17 Manor Vale, Brentford, Middlesex.

NORTHAMPTONSHIRE

Corby Universal Micro Club. Meets at Lodge Park Sports Centre fortnightly on alternate Wednesdays and Thursdays. Contact Peter Wilson, 26 North Cape Walk, Corby. Mr Great Oakley 742622.
Kettering Microcomputer Club. Meets every Wednesday at 7pm. Details from Stephen Bickle on 0536 514381.
South Northants microcomputer club. Contact Simond Clark in Towcester on 0327 52191.

NOTTINGHAMSHIRE

Ashfield Computer Club meets at Carsic Junior School, St Mary's Road, Sutton in Ashfield on the first and third Thursday month. Derick Daines, c/o Cuttings Avenue, Sutton in Ashfield, Notts.
Eastwood Town Micro Computer Club meets at Devonshire Drive Junior School Wednesday at 5.45pm. Ted Ryan, 15 Queens Square, Eastwood, Nottingham NG16 3BJ.
Nottingham Microcomputer Club meets at Congregational Federation Centre, Castle Gate Centre, Nottingham, second Monday of each month at 7.30pm. Mr E Harvey, 68 Rosedale Avenue, Nottingham NG3 6FH. Nottingham 608491.
Retford Computer Club meets bi-weekly at the Ivy Leaf Club, Retford, at 7.30pm. Contact John Lannigan on Retford 700134.
Worksop Computer Group. Mr Andrews, Worksop 487327.

NORFOLK

Anglia Computer User Group. Jan Rejzl, 128 Templemere, Sprowton Road, Norwich. 0603-29652.
Breckland Computer Club. Contact Andrew Hiom, 11 Annafewes Close, Thetford, Norfolk. Meets each Saturday, 5pm at this address.
Dereham & District Computer Club. Meets at Middle School, Westfield Road, Toftwood, East Dereham on every second Wednesday at 7.30pm. Contact Mrs Fran Cook. Dereham 67732.
East Anglian Computer User's Group meets at Crome Community Centre, Telegraph Lane, Norwich. Gill Rijzi, 88 St Benedicts, Norwich.
Gorleston Computer Club meets at Unit 26, Longs, Englands Lane, Gorleston, Great Yarmouth on Fridays at 6.30pm. Tel: 0493-6000003.
Yarmouth Computer Club meets each Friday at 7pm. Contact the club at Unit 26, Longs Estate, Englands Lane, Gorleston, Great Yarmouth, Norfolk, 0983 662871.

NORTHERN IRELAND

Belfast Computer Club meets 7pm on first Monday of each month at Ashby Institute, Stranmillis Road, Belfast 9. Contact Patrick Roddie on Holywood 3212.

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North Down Microcomputer Club meets on the last three Mondays of each month. Contact E. Dook on 0247 50902.

OXFORDSHIRE

Association of Computer Clubs. Rupert Steele, St John's College, Oxford OX1 3JP.
Microsoc meets at Clarendon Lab, Parks Road, Oxford, every week during term. Rupert Steele, St John's College, Oxford OX1 3JP.
Oxford Personal Computer Club. Len Phelps, Southport Cottage, Sutton Courtenay, Nr Abingdon, Oxon OX14 4AU.
Ridgeway Computing Club meets at Swan Hotel, East Ilsley, on the second Tueday month. Mike Magney, Beavers, South Street, Blubury, Didcot, Oxon OX11 0JU.

SCOTLAND

Bishopton Computer Club, Renfrewshire, meets bi-weekly. Contact Alasdair Law on Bishopton 863137.
Dundee — Kingsway Amateur Computer Club. Meets in rooms C11 & C12, Kingsway Technical College, Old Glamis Road, Dundee on Thursdays at 6.30pm. Contact J. Cook at the college on 0382 819021 or C. Macleod, 101 Peddie Sreet, Dundee.
Edinburgh Home Computing Club meets at Crosswinds Community Centre, Tollcross, Edinburgh, on the 2nd, 3rd and 4th Thursday of month from 7-10pm. I. Robertson, 031 441 2361.
Scottish Amateur Computer Society, Mike Anthony, 46 Morden Park Gardens, Edinburgh EH17 7JR.
Cairns Computer Club meets each Saturday at 7.30pm at Cairns Church Hall, Lanark, Scotland. Contact N. Kirkpatrick, 3 Wellington Terrace, Lanark, Strathclyde, Scotland.
Central Scotland Computer Club meets at Falkirk College of Technology, Grangemouth Road, Falkirk, on the first and third Thursday of month. James Lyon, 78 Slamannan Road, Falkirk FK1 5NF.
Fife Computer Users Club meets fortnightly. Murray Simpson, 31 Tom Steward Lane, St Andrews, Fife, KY16 8YB.
Grampian Amateur Computer Society meets at 35 Thistle Lane, Aberdeen, on the second and fourth Monday every month at 7.30pm. Alan Morrison, 21 Beech Road, Westhill, Skene, Aberdeenshire AB3 6WR.
Kemnay Computer Club meets weekly. S Stubbs, 15 The Glebe, Kemnay, Inverurie, Aberdeenshire.
Inverness Personal Computing Club meets every second Tuesday at 7.30pm. Gyl Mackenzie, 38 Ardconnel Street, Inverness IV2 3EX, 0463 220922.
Perth & District Amateur Computer Society meets at Riverside Lounge, Bridgend, Perth, on the third Tuesday of month at 7.30pm. Alastair McPherson, 154 Oakbank Road, Perth PH1 1HA.
Skye and Lochalsh Computing Society. Contact C Manvell, Tigh na Pairc, 25 Lower Breakish, Isle of Skye IV42 8QA, 04712 317.
Strathclyde Computer Club meets at Wolfson Centre, 106 Rottenrow, Glasgow, on the third Wednesday of month. B Duffy, 24 Lomond Drive, Condorrat, Cumbernauld G4 8NW.

SHROPSHIRE

Ludlow & District Microcomputer Club meets at Diocesan Education Centre, Lower Galdeford, Ludlow, on the second Monday of month at 7.30pm.
Shrewsbury Micro Club meets at Shrewsbury Shirehall once a month. Mr V Ives, 6 Bramley Close, Severn Meadows, Shrewsbury SY1 2TP.
Telford Computer Club meets at Telford ITEC on Monday 6-9pm. John Murphy, 10 Brichmore, Brookside, Telford TF3 1TF. 0952 595959.

SOMERSET

Sharp MZ80 Club, Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset.
Taunton Computer Club, meets 6pm on Tuesdays during term time at Somerset College of Arts and Technology. Contact David Elliott at Fir Tree House, Back Lane, Westbury-sub-Mendip, Wells, Somerset.
Yeovil Computer Club. D G Carrington, 2 Romsey Road, Yeovil, BA21 5XN.

STAFFORDSHIRE

Alsager Computer Club, meets at Alsager Comprehensive School, Stoke-on-Trent, Staffs, fortnightly on Tuesday. Rex Charlesworth, 09363 77270.
North Staffs Amateur Computer Club meets on the third Wednesday of each month. J Roll, 16 Hill Street, Hednesford, Staffordshire WS12 5DS.
ICL Birmingham Branch Micro Club, c/o WBA Ecclestone, 26 Browns Lane, Tamworth, Staffs.
Tame Computer Club. Contact A. Beckett, 57 Adonis Close, Tamworth, Staffs. Meetings bi-weekly, Friday, 7pm.

SUFFOLK

Haverhill Microcomputer Club, meets at St Marys' Church Hall, Camps Road, Haverhill, on the second, third and fourth Wednesday of month at 7.30 to 10pm. Andrew Holliman, 5 Trinity Close, Balsham, CB1 6DW, 022 029 583.
Newmarket Home Computer Group. Meets at Anchor House, Moat Lane, Towcester, at 7.30pm. Contact Simon Clark, 83 Watling Street, Towcester, Northants NN12 7AG, 0327 52191.
Suffolk Microcomputer Club meets monthly. Mr S Pratt, c/o Microtek, 15 Lower Brook Street, Ipswich.

SURREY

Ashtead Computer Club meets on the last Thursday of month. Contact P Palmer, 8 Corfe Close, Ashtead.
Deaf Microcomputer Users Group. Contact Chris Marsh, 3 Delaporte Close, Epsom, Surrey KT17 4AF.
Thames Valley Amateur Computer Club meets at Griffon, Caversham, on the first Tuesday of month. Brian Quarm, 25 Roundway, Camberley, GU15 1NR, Camberley 22186.
Ewell Micro Club, Dave De Silva, 316 Kingston Road, Ewell, KT19 0SU.
Farnham Computer Club, meets at Farnham 6th Form College, Morley Road, Farnham, on the second Wednesday of month. Adam Sharp, 14 Thorn Road, Boundstone, Farnham.
West Surrey Computer Club meets at Paddock Room, Green Man Public House, Burpham, Guildford, the first Thursday of month. Chris Karney, 0483 68121.
ITN Computer Club meets on Fridays. A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, 0483 39035.
CBBS London meets on Sundays 4-10pm. P Goldman, PO Box 100a, Surbiton, KT5 8HY.
Richmond Computer Club meets at Richmond Community Centre, Sheen - Road, on the second Monday of month at 8pm. Bob Forster, 18a The Barons St Margarets, Twickenham, Middlesex, 01-892 1873.
Sutton Library Computer Club meets at Central Library, St Nicholas Way, Surrey, on the first Friday of month and third Tuesday of month at 8.30pm. Dave Wilkins 01-642 3102.
Association of London Computer Clubs, Len Stuart, 89 Mayfair Avenue, Worcester Park, KT4 7SJ.

SUSSEX

Arun Microcomputer Club meets at Wick Amenity Centre, Wick Farm Road, Littlehampton, on the first Monday of month at 8pm, and third Sunday of month at 6pm. P Dorriman, 7 Talbot Road, Littlehampton, West Sussex DN17 7BL
Bognor Computer Club meets at RAFA club, Wateroll Square, Bognor Regis, West Sussex at 7.30pm on last Thursday of each month. BBC subgroup meets second Thursday. Contact Leo Hughes, 20 Pinehurst Park, Aldwick, West Sussex.
Brighton, Hove & District Computer Club. Meets 7.30pm every second Wednesday at Southwick Community Centre. Contact J Smith, 30 Leicester Villas, Hove, E Sussex.
Crowborough Computer Club meets first, second and fourth Tuesday of each month. Contact Bruce Piggott on 089 26 62970.
CVGC Video Games Club. Contact G Bond, 7 Swift Lane, Langley Green, Crawley Sussex.
Eastbourne & District Computer Club meets at 7.30pm on last Wednesday of each month at the WRVS Centre, Hyde Road, Eastbourne. Jim Booth, 0323 51437.
Horsham Microcomputer Club. Meets at the Forest Community School, Comptons Lane, Horsham on second Wednesday of each month from 7.30pm. Philip Dickinson 0403 60965 or Jim Laing 0403 67522.
Midhurst & District Computer User Group. Meets at the Grange Centre, Midhurst, at 7pm on the second and fourth Thursday of every month. Contact Val Weston, tel: Midhurst 3876.
Mid-Sussex Microcomputing Club. Contact Jeff Hayden, 2 Hillary Close, East Grinstead, RH19 3XD.
West Sussex Microcomputer Club meets at Room RO6, Robinson Road Annexe, Crawley, on the first and third Monday of month. J Clarke, 31 Hyde Heath Court, Pound Hill, Crawley. 0293-884207
Worthing & District Microcomputer Club meets at Rose Wilmot Youth Centre, Littlehampton Road, Worthing, on alternate Sundays 11am-1pm. B. Thomas, 11 Gannon Road, Worthing, W. Sussex, BN11 2DT, 0903 36785.

TYNE & WEAR

Newcastle upon Tyne Personal Computer Society meets at Room D103, Newcastle Polytechnic on the first Tuesday of every month. Pete Scargill, 21 Percy Park, Tynemouth, 0632 573905.

WALES

Abergele Computer Club meets at Abergele CI Offices every Thursday at 7.30-10pm. W Jones, 77 Millbank Road, Rhyl, Clwyd.
Beddau & District Computer Club, meets at Beddau Community Centre, 7pm, Mondays. Nigel Butters, Newtown, Llantwit 206305.
Clwyd '80 Computer Club. Contact Allan Jones, The Island, 1 High Street, Connah's Quay, Deeside, Clwyd, 0244 816893. Meets at Deeside Community Centre, Queensferry, Deeside on Thursday at 7pm.
Colwyn Computer Club meets at the Greens Hotel, Colwyn Bay, at 7pm. Contact D Bevan, c/o Abergele Road, Colwyn Bay, Clwyd LL29 7PA.
Gwent Amateur Computer Club meets at St Mary's Institute, Stow Hill, Thursday at 7.30pm. Rothery Harris, 16 Aladdin Close Avenue, Newport, Gwent, Wales NPT 6QJ.
Llantwit Major Computer Club. Meets at Adult Education Centre, Llantwit Major, every Tuesday. Contact Douglas Mountain, 16 Denbigh Drive, Llantwit Major, South Glamorgan CF6 9GQ.
Mold Computer Club. Meets 7.30pm on first and third Thursday of each month at the Dawn Owen Centre, Earl Street, Mold. Contact G Johnson, 18 Daytona Drive, Northop Hall, Mold, Clwyd, Wales. Tel Deeside 821945.
Milford Central Computer Club. Open to schoolchildren, meets every lunch hour and evening. Contact Harry Evans, Milford Central School, Prioryville, Milford Haven, Dyfed, 043 784 571.
Newtown & District Computer Club meets first and third Wednesday of each month. Contact John Dale on 068 688 502.
Pencoed Amateur Computer Club meets fortnightly on Saturdays at Pencoed Welfare Hall. Philip Williams, 38 Bryn Rhedyn, Pencoed, Bridgend, Mid-Glamorgan CF35 6TL, 0656 860307.
Pontypool Computer Club meets at The Settlement, Roackhill Road, Pontypool, Gwent, on Friday. Graham Loveridge, on Pontypool 2827.
Swansea & Southwest Wales Amateur Computer Club meets on the last Friday every month. Paul Griffiths, 1 Prescelli Road, Penlan, Swansea SA5 8AF.
Swansea Computer Club. Meets at No 10 (pub). Union Street every Tuesday at 7.30pm. Contact Robert Palmer, 044 123 602.
Wrexham & District Computer Club. Meets each Thursday. Contact Mike Houghton, 1 Snerwell Avenue, Wrexham, Clwyd, Wales.

WARWICKSHIRE

Stratford Computer Club meets at the Wesley Hall, Stratford upon Avon, on the second Wednesday of each month at 7pm. Details from Chris Parry on 0789 68080.
Idiots' Computer Club. £1 gives you an elastic band and information sheet. This club is for morons only. Contact William Mitchell, Highmoor House, Green Lane, Welton, Lincolnshire.

WEST MIDLANDS

Cannock Computer Society meets at Cannock Computer Systems, Old Penkridge Road, Cannock, fortnightly. Terry Sale, 20 Redwood Drive, Chase Terrace, Walsall WS7 8AS.
Coventry Computer Circle. Contact Chris Baugh, 9 Hillman House, Smithford Way, Coventry CV1 1FZ.
Coventry Micro Club meets on Wednesdays at 7.30pm at Walsgrave Junior School. Jack Hewitt, 3a Boswell Drive, Walsgrave-on-Sowe, Coventry, Tel: 615543.
Walsall Computer Club meets at Park Hall Community School on the second and fourth Monday month 6.45-9.45pm. Alison Hunt, 58 Princes Avenue, Walsall, WS1 2DH. 0922 23875.
West Midlands Amateur Computer Club meets at Enfield School, Love Lane, Stourbridge, on the second and fourth Tuesday of month. John Tracey, 100 Booth Close, Brierley Hill, Kingswinford, 0384 70097.

WILTSHIRE

Chippenham and Calne, proposed new club. Matthew Jones, Pinhills, Calne SN11 0LY.
Chippenham Computer Club. Contact Peter Knaggs, 12 Seymore Road, Chippenham or call Chippenham 654940.

WORCESTER

Worcester & District Computer Club meets at Old Pheasant Inn, New Street, Worcester, on the second Monday month at 8pm. D Stanton, 55 Vauxhall Street, Rainbow Hill, WR3 8PA.

YORKSHIRE

Barnsley Co-Operative Computer User Group meets at Co-Op Social Club, Pogmore, Barnsley, on the last Tuesday month at 7.30pm. James Bridson, c/o 39 Kereforth Hall Road, Barnsley, South Yorks S70 6NF, 0226 41753.
Calderdale Computer Club meets on first Tuesday of each month. Contact Ray Franklin on 0279 815088.
Greenhead Grammar School Computer Club. Brian Smith, Greenhead Road, Keighley, West Yorks BD20 6EB, 0535 62828.
Huddersfield Computer Club meets every Monday. Chris Townsend, 760/4 Manchester Road, Linthwaite, Huddersfield, 0484 657299.
Ilkley Computer Club meets alternate Fridays at Ilkley College, West Yorks. Contact C. Prince, 15 Sandholme Drive, Burley in Wharfedale, West Yorks.
Keighley Computer Club. Meets each Wednesday at 7.30pm at Methodist Church Hall, Market Street, Keighley, West Yorks. Contact Simon Midgley on 0535 681463.
Leeds Microcomputer Users Group meets at 8 Regent Street, Chapel Allerton, fortnightly on Thursday at 6pm. David Parsons, 22 Victoria Walk, Horsforth LS18 4PL.
Program Power, R Simpson, 5 Wemsley Road, Leeds LS7 2BX, 0532 683186.
Shipley College Computer Group meets on Tuesdays. Paul Channell, tel: 0274 595731.
South Yorkshire Personal Computer Group meets at General Lecture Theatre, St Georges Building, Mappin Street, Sheffield, on second Wednesday month at 7.30pm. Paul Sanderson, 8 Vernon Road, Tetley, Sheffield S17 3QE.
Thurnscoe & District Micro Users' Club meets at Thurnscoe Comprehensive School, Physics Lab, Clayton Lane, Thurnscoe, Wednesday at 7.30pm during school term. Mr James Davis, 62 Tudor Street, Thurnscoe East, 0709 893880.
West Yorkshire Microcomputer Group meets on Tuesdays. Phillip Clark, c/o Suite 204, Crown House, Armley Road, Leeds LS12 2ES, 0532 636232
York Computer Club meets at the Enterprise Club every Monday at 8pm. K Thomas, Green Lea, Ripon Road, Harrogate, HG1 2BY, 0904 38239.

Computer clubs are proliferating, so much so there are two beavering in Aylesbury, Bucks, and causing *PCN* confusion. Hence we rather muddled them in Clubnet, Issue 46. We talked about Aylesbury Computer club but should have been talking about The Computer Club in Aylesbury — altogether a different kettle of chips. Not surprisingly, the contacts were mixed up, too. Dr David Nowotnik, of 12 Long Plough, Aston Clinton, (0296 630867) is the man for ACC. Sorry about the confusion . . . but you can see how it happened . . .

Special thanks to the Association of Computer Clubs from whom clubnet was originally compiled in *PCN*'s early days.

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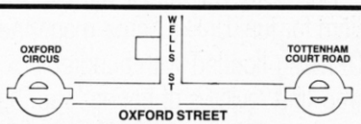

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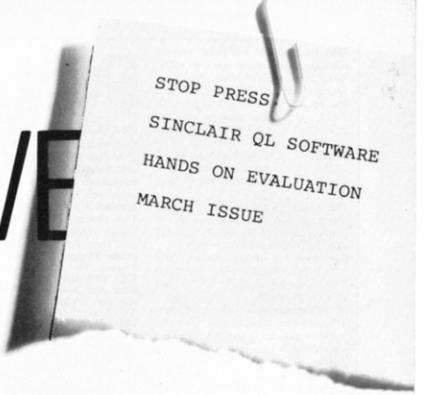

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Vic bits, Two Motherboards, Adventureland, Road Race, Super Lander, M/C Monitor, Programmers Aid, super expander, many games, the list goes on. Tel: Martyn 0268 696638.

Wanted BBC B. Will pay a good price. Contact Colin Graham, Wilderness House, Stokes Road, Corsham, Wilts. Tel: (0249) 712231. After 4pm.

Spectrum software sale (originals): half list price. 36 tapes. (eg Hobbit, Scrabble, Vu-Calc, K. Quest, Bugaboo, 3D Ant, Miner, J. Jack). All vgc. Tel: Gordon 01-806 0505 (daytime).

Swap Spectrum software, many titles. Send your list for mine. Daniel Koehler, 29 Av Dunois, 94240 L'Hay Les Roses, France.

Spectrum displays, word processes and prints 50 characters per line. Choose height, spacing and position. £2 for cassette. JR Burgess, 26 Cubbington Road, Leamington CV32 7AB.

BBC Micronet ROM brand new £15. Amcom DFS with manual and disc £25. Prism acoustic modem for Prestel £50. Tel: Canterbury 750600.

Swap Spectrum software over 70 popular titles to swap. Please send your list for mine. Eddie, 65 Anner Road, Dublin-8, Ireland.

Sharp MZ-80K 48K. As new, boxed with Basics, Forth, m/c utilities, games, books, user notes, ask £225. Still under guarantee. Tel: (0695) 422472.

Spectrum software to sell or swap. Escape MCP, Swordfight, Space Raiders, Dreadnoughts, Ship of Doom, and many more. Tel: 886 7275 after 5pm ask John.

Vic-20 cassette software, Vi-calc (calculator on screen), Adventures, Magic Mirror and Werewolf Curse, £5 each or all three for £10. Tel: Paul on (0455) 637427.

Video Genie 48K, hi-res graphics unit, Gnomic interface, Tandy monitor, cost £800. Over £900 of software. All for £450 ono. Tel: Blackburn (0254) 664203.

Wanted BBC B, 1-2 OS. Tel: 01-223 7196 after 6 pm

Terminet 30 printer/keyboard, on stand. Upper/lower case. 80 cols/RS232/Sprocket feed. Complete but minor fault so £75 ono. Tel: Rainford (074488) 3918.

Dragon 32 games, Alcatraz II, Frogger, £5 each. Tel: Michael Octave, 01-693 0595, after 4pm.

Atari tape software to swap. Large selection to choose from 16K or 48K. Tel: Bedford 44060 any evening.

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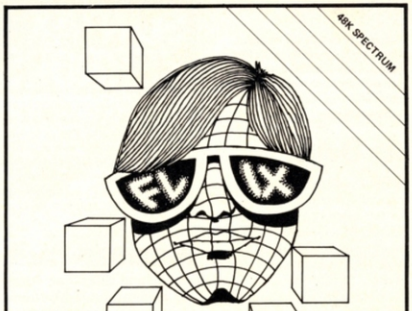

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Dizzy heights

WH Smith has been welcoming visitors flying in to Heathrow with this promotion of Acorn's new 'Electronic' computer, presumably the latest in a long line of steam, gas and hydraulic micros.

The 'Electronic' was unfortunately out of range of the camera.

Coming next week

***One Today*— Millions of words later, after dozens of hardware and software Pro-Tests, with scores of program listings under our belts, not to mention 18 complete pull-out-and-keep guides to a startling array of essential topics, finally Personal Computer News clocks up its first year . . . and embarks upon its second with much more of the same, only better.**

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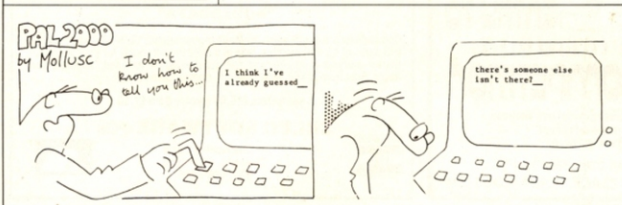
What's in a name Dept.

It's called the MacIntosh because California's full of fruit cakes. *PCN* hasn't really made much of the slightly non-standard spelling of Apple's latest. We're a liberal bunch, and if Apple wants to spell MacIntosh thus, that fine by us.

But north of the border, controversy rages. The letters column of the Glasgow Herald tells us that the prefix 'Mac' should only be followed by a capital letter if the remainder of the word is a proper name. Hence MacDonald. And how many people called Intosh do you know? Please don't write . . .

Macintosh, as it should correctly be, translates from the Gaelic as 'son of the leader.' Lisa is then a corruption of the Gaelic leader, we suppose.



SYNTAX ERRORS

The Pied Piper communications package which we said last week costs £230 includes the price of a Buzzbox hardwired modem. And distributor STM (Europe) says that the new 16-bit IBM-compatible micro will not replace its existing 8-bit system, but will complement it.

Mexican fruit

Apart from cultivating drooping moustaches and torturing themselves with very hot food, Mexicans have another peculair attitude that tends to limit the attractions of their country to the makers of computers. They like their manufacturers to be local.

This puts the grasping US multinationals in a spot.

Apple has found one way round this — it has joined a partnership with a Mexican company called Groupo Manzana, which will hold 51 per cent of the resultant joint venture. Since its name is the Spanish for 'Apple Group' it should know what it's about.

PCN DATELINES

PCN Datelines keeps you in touch with up-coming events. Make sure you enter them in your diary.

Organisers who would like details of coming events included in PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

UK EVENTS

Event	Dates	Venue	Organisers
Information Technology & Office Automation Exhibition and Conference	February 21-24	Barbican Centre, London EC1	B.E.D. Exhibitions Ltd., 01-647 1001
Educational Software Fair	March 2-3	Dauntsey's School, West Lavington, Devizes, Wilts	P. Harris, Lavington 2446
OEM Only Conference	March 7	Hilton Hotel, London W1	Tom Lewis, 01-994 6477
Computer Trade Show	March 13-15	Wembley Conference Centre	Reed Exhibitions, 01-643 8040
Scottish Computer Conference	March 13-15	Holiday Inn, Glasgow	Quadrilect, 01-242 8697
Electron & BBC Micro User Show	March 29-April 1	New Horticultural Hall, Westminster, London	Susie Lipman 061-456 8383
Computer Aided Design	April 3-5	Met. Exhibition Hall	Reed Exhibitions, 01-643 8040
Artificial Intelligence Seminar	April 7-8	City University, London	Warm Boot Ltd, 01-368 7561
Sir Frederick Osborn School Computer Fair	April 8	Sir Frederick Osborn School, Welwyn Garden City	Alan Henderson, Welwyn Garden 23367/8
COMPEC WALES	April 10-12	Cardiff University	Reed Exhibitions, 01-643 8040

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Personal Business Computer Show	February 29-March 3	Hong Kong	Overseas Exhibition Services Ltd., 01-486 1951
Personal Computer Show	March 14-17	Sydney, Australia	ECL Ltd, 01-486 1951
International Business Equipment & Computer Show	March 13-17	Singapore	International Business Centre Co. Ltd., 8F Hosoi Building, 15-7, 5-chome Honmachi, Higashi-ku, Osaka, Japan

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